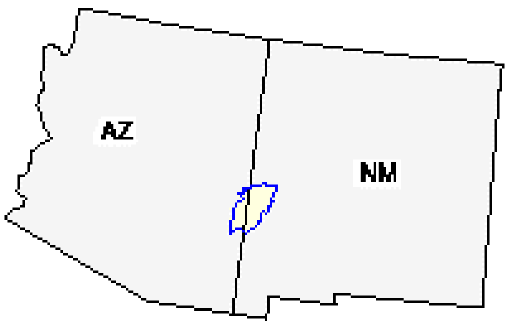
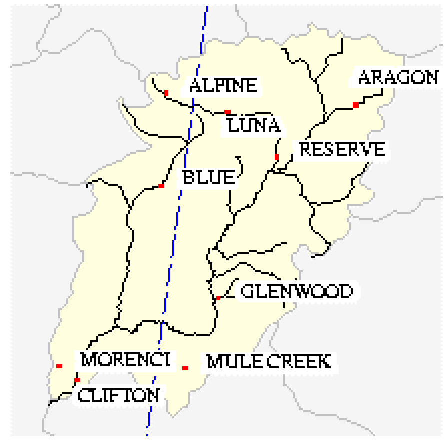
TOTAL MAXIMUM DAILY LOAD FOR TEMPERATURE ON THE SOUTH FORK OF NEGRITO CREEK FROM THE CONFLUENCE WITH THE NORTH FORK TO THE HEADWATERS





Summary Table

New Mexico Standards Segment	San Francisco River, 20.6.4.603 (formerly 2603)
Waterbody Identifier	South Fork of Negrito Creek from the confluence with North Fork to the headwaters, (5.4 mi.)
Parameters of Concern	Temperature
Uses Affected	High Quality Coldwater Fishery
Geographic Location	San Francisco River Basin (SFR4-20620)
Scope/size of Watershed	2,790 mi^2 (San Francisco)/ 42 mi^2 (TMDL area)
Land Type	Ecoregion: Arizona/New Mexico Mountains
Land Use/Cover	Forest (84%), Rangeland (15%), Agriculture (1%)
Identified Sources	Removal of Riparian Vegetation
Watershed Ownership	Forest Service (97%), Private (3%)
Priority Ranking	4
Threatened and Endangered Species	None
TMDL for: **Temperature**	TMDL = WLA + LA + MOS 0 + 38.2 (joules/meter^2/second/day) + 4.25 (joules/meter^2/second/day) = **42.5 (joules/meter^2/second/day)**

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LIST OF ABBREVIATIONS

BMP	best management practice
CFS	cubic feet per second
CMS	cubic meters per second
CWA	Clean Water Act
CWAP	Clean Water Action Plan
CWF	cold water fishery
EPA	Environmental Protection Agency
GPS	Global Positioning System
HQCWF	high quality cold water fishery
LA	load allocation
MGD	million gallons per day
mg/L	milligrams per liter
MOS	margin of safety
NMED	New Mexico Environment Department
NPDES	national pollution discharge elimination system
NPS	nonpoint sources
NTU	nephelometric turbidity units
SSTEMP	Stream Segment Temperature Model
SOP	Standard Operating Procedure
SWQB	Surface Water Quality Bureau
TMDL	total maximum daily load
UWA	Unified Watershed Assessment
WLA	waste load allocation
WQLS	water quality limited segment
NMWQCC	New Mexico Water Quality Control Commission
WQS	water quality standards

EXECUTIVE SUMMARY

Section 303(d) of the Federal Clean Water Act requires states to develop total maximum daily load (TMDL) management plans for water bodies determined to be water quality limited. A TMDL documents the amount of a pollutant a waterbody can assimilate without violating a state's water quality standards. It also allocates that load capacity to known point sources and nonpoint sources. TMDLs are defined in 40 CFR Part 130 as the sum of the individual Waste Load Allocations (WLA) for point sources and Load Allocations (LA) for nonpoint sources, including a margin of safety and natural background conditions.

South Fork of Negrito Creek off of Forest Road 141

The San Francisco River Basin, located in southwestern New Mexico, is a sub-basin of the Upper Colorado River. From its headwaters, the river flows east into New Mexico and then makes a 75 mile clockwise loop before eventually re-entering the state of Arizona. Recent monitoring efforts by the Surface Water Quality Bureau (SWQB) have documented exceedances of New Mexico water quality standards for temperature on South Fork of Negrito Creek from its confluence with North Fork to the headwaters. This determination is based on data obtained from a temperature monitoring station located approximately one half mile below the confluence with North Fork Negrito. Exceedances frequency was 33.2%, which represents 574 exceedances out of a total of 1,730 temperature readings (see Appendix A). The Stream Segment Temperature Model (SSTEMP) was used in this TMDL to estimate resulting stream temperatures from several factors in the watershed (USGS 1997). Due to the seasonal nature of temperature exceedances, the model runs were for the summer months only. This document addresses these seasonal exceedances. When formally adopted by the New Mexico Water Quality Control Commission (WQCC), the TMDL will be incorporated into the State's Water Quality Management Plan by reference.

A general implementation plan for activities to be established in the watershed is included in this document. The Surface Water Quality Bureau's (SWQBs) Watershed Protection Section will further develop the details of this plan. Implementation of recommendations in this document will be done with full participation of all interested and affected parties. During implementation, additional water quality data will be generated. As a result, targets will be re-examined and potentially revised; this document is considered to be an evolving management plan. In the event new data indicate the targets used in this analysis are not appropriate or if new standards are adopted, the load capacity will be adjusted accordingly. When water quality standards have been achieved, the reach will be removed from the §303(d) list.

South Fork of Negrito Creek

Background Information

South Fork of Negrito Creek Campground off of Forest Road 141

The South Fork of Negrito Creek is located in southwestern New Mexico. The South Fork originates in the Negrito Mountains, and flows 5.4 miles to its confluence with Negrito creek and into the Tularosa River, in Catron County. The drainage area is approximately 42 square miles for South Fork of Negrito, and the Negrito system (North Fork, South Fork and the Main stem Negrito Creek) is approximately 337 square miles draining into the Tularosa River. Forest covers 84% of the South Fork watershed, 15% is rangeland and 1% is agricultural (see Figure 1). The land ownership is primarily Forest Service (97%) with some privately owned (3%) (see Figure 2).

This 5.4 mile reach of the South Fork of Negrito Creek is contained within water quality standards segment 20.6.4.603. Designated uses for this reach are domestic water supply, fish culture, high quality coldwater fishery, irrigation, livestock watering, wildlife habitat, and secondary contact.

This TMDL addresses temperature exceedances in only the uppermost 5.4 miles of the South Fork of Negrito Creek, and secondary tributary to the San Francisco River, in segment 20.6.4.603. Probable source(s) of nonsupport are identified as being removal of riparian vegetation.

Endpoint Identification

Target Loading Capacity

The New Mexico Water Quality Control Commission (WQCC) has adopted numeric water quality standards for temperature to protect the designated use of High Quality Coldwater Fishery (HQCWF). These water quality standards have been set at a level to protect coldwater aquatic life. The HQCWF use designation requires that a stream have water quality, streambed characteristics, and other attributes of habitat sufficient to protect and maintain a coldwater fishery. The primary standard leading to an assessment of use impairment is the numeric criterion for temperature of 20 °C (68°F)[1].

[1] **New Mexico Water Quality Control Commission, *State of New Mexico: Standards for Interstate and Intrastate Surface Waters (20.6.4 NMAC)*, 20.6.4.900 NMAC Standards Applicable to Attainable or Designated Uses Unless Otherwise Specified in 20.6.4.101 Through 20.6.4.899 NMAC.**

Waste Load Allocations and Load Allocations

Waste Load Allocation (WLA)

There are no point source contributions associated with this TMDL. The waste load allocation is zero.

Load Allocations (LA)

The Stream Segment and Stream Network Temperature Models[2]

A temperature model SSTEMP was utilized for the South Fork of Negrito Creek to predict stream temperatures based on the stream's geometry, hydrology and meteorology. These values were then compared to actual thermograph readings measured in the field (see Appendix A). The temperature model SSTEMP was utilized to identify current stream and/or watershed characteristics that control stream temperatures in the South Fork of Negrito Creek. The model also quantifies the maximum loading capacity of the stream to meet the water quality standard for temperature (maximum of 20° C). This model is important for estimating the effect of changing controls or factors (such as riparian grazing, stream channel alteration, and reduced streamflow) on stream temperature. The model can also be used to help identify possible implementation activities to improve stream temperature by targeting those factors causing impairment to the stream.

SSTEMP Model utilized South Fork of Negrito Creek geometry, hydrology, and meteorology to predict minimum 24-hour temperatures, mean 24-hour temperatures, and maximum 24-hour stream temperatures for the hottest times of the year. These values were then compared to actual temperature values taken from the stream (thermograph data) (see Appendix B).

The maximum daily water temperature is calculated by following a parcel of water from solar noon at the top of the stream segment to the end of the segment, allowing it to heat up towards the maximum equilibrium temperature.

Water temperature can be expressed as heat energy per unit volume. The Stream Segment Temperature Models (SSTEMP) provide an estimate of heat energy per unit volume expressed in Joules (the absolute meter kilogram-second unit of work or energy equal to 10^7 ergs or approximately 0.7375 foot pounds) per meter squared per second ($J/M^2/S$) and Langleys (a unit of solar radiation equivalent to one gram calorie per square centimeter of irradiated surface) per day.

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[2] **US Geological Survey, Biological Resource Division, Mid-continent Ecological Science Center, River Systems Management Section, Fort Collins, CO, 1997. *The Stream Segment and Stream Temperature Models, Version 1.0*, pp. 35-50**

Figure 1

HUC 5 NAME		
Negrito Creek		
HUC	ACRES	MI^2
4060020	28,941	45.22
4060060	19,865	31.04
		76.26

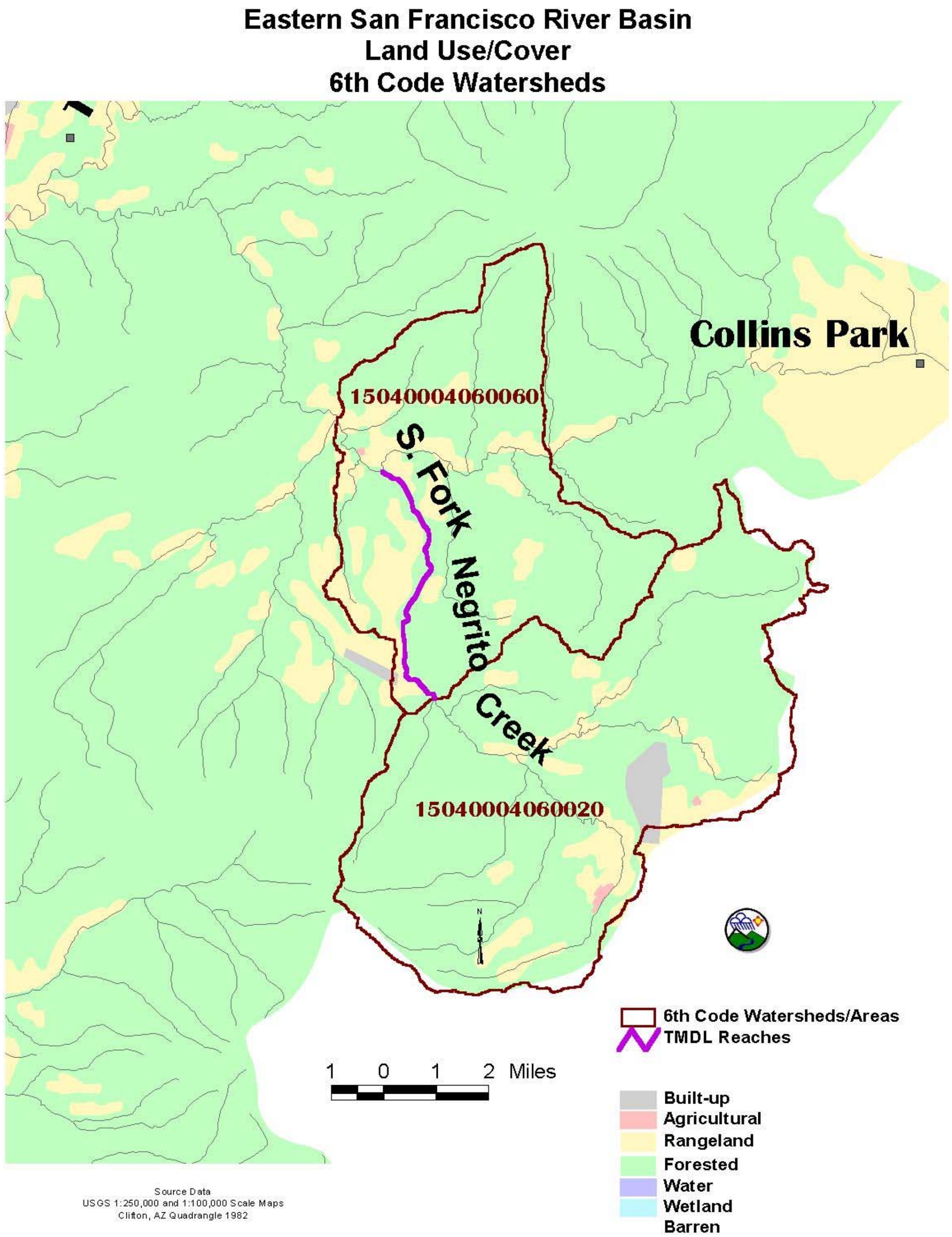
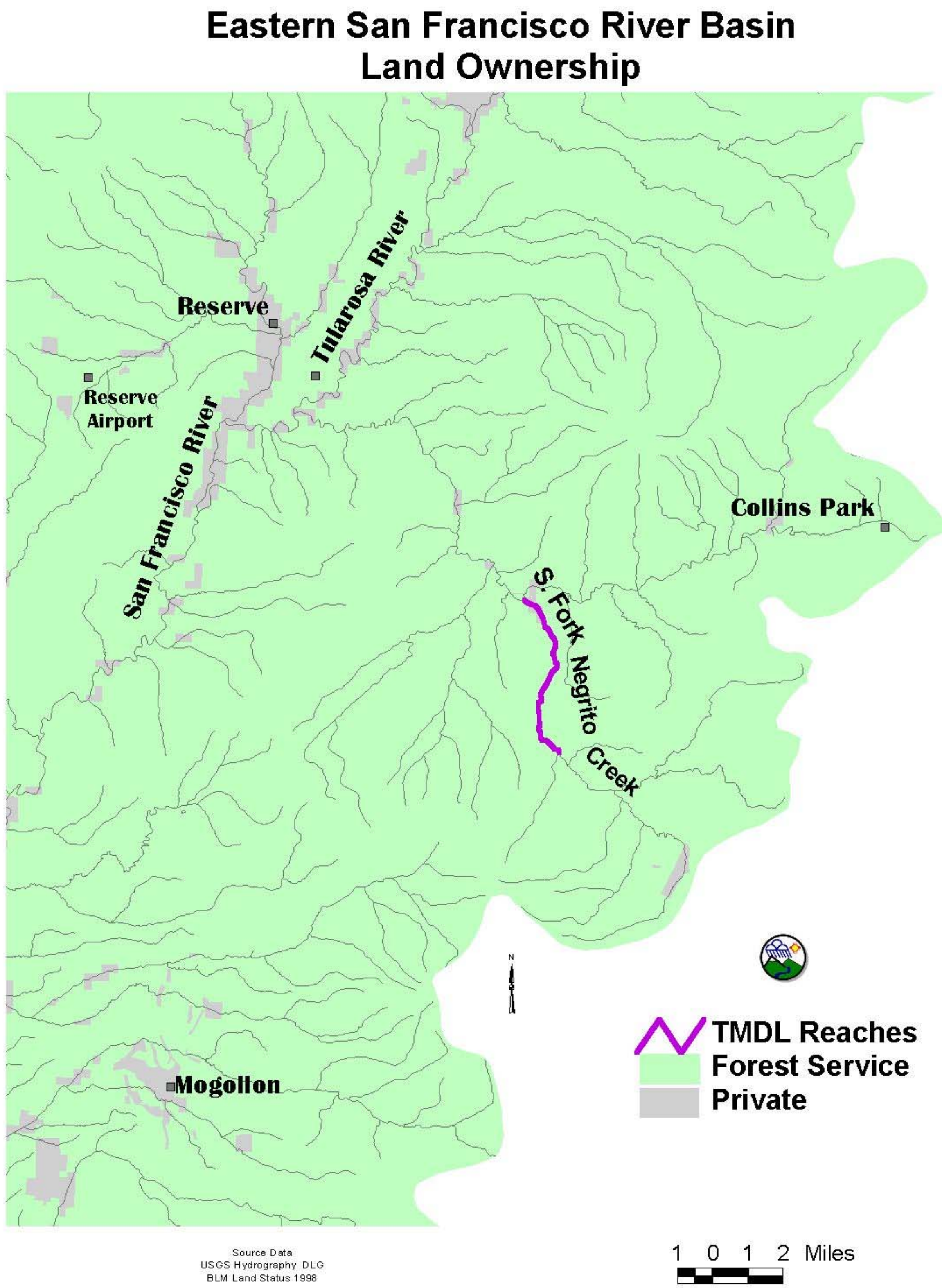


Figure 2


Eastern San Francisco River Basin
Land Ownership
Reserve
Tularosa River
Reserve Airport
San Francisco River
Collins Park
S. Fork Negrito Creek
Mogollon
TMDL Reaches
Forest Service
Private
Source Data
USGS Hydrography DLG
BLM Land Status 1998
1 0 1 2 Miles

The SSTEMP programs are currently divided into three related but separable components or sub models. Though, technically, the programs can be run in any order, for our purposes, we will conceptualize them in a physically based order (see Figure 3).

Determining the Local Solar Radiation (SSSOLAR)[3]

To parameterize the model, follow the procedure outlined below:

Number of Days – The number of days is a factor, which tells the program when and how often to sample during the period. If the results are for a single day only, use one day. For periods between a day and a month, 2 days is sufficient. Time periods greater than a month are not recommended.
Beginning Month and Day – Enter the number of the month and day, which start the time period of interest.
Ending Month and Day – Enter the number of the month and day, which end the time period of interest.
Latitude (degrees and minutes) – Latitude refers to the position of the stream segment on the earth's surface relative to the equator. It may be read from any standard topographic map. You should enter both degrees and minutes in the spaces provided.
Elevation – Read the mean elevation off of the topographic map.
Air Temperature (°F) – Mean daily air temperature representative of the time period modeled (see Appendix D).
Relative Humidity (percent) – Mean daily relative humidity representative of the time period modeled.
Possible Sun (percent) – This variable is an indirect measure of cloud cover. Ten percent cloud cover is 90% possible sun. Estimates are available from the weather service or can be directly measured.
Dust Coefficient – This dimensionless value represents the amount of dust in the air. Representative values are:

Winter	-	6 to 13
Spring	-	5 to 13
Summer	-	3 to 10
Fall	-	4 to 11

If all other variables are known, the dust coefficient may be calibrated by using known ground-level solar radiation data. For the purposes of this model, an intermediate value is sufficient; the model is not very sensitive variable. For example, when modeling summer conditions, entering 6.5 will suffice.
Ground Reflectivity (percent) – The ground reflectivity is a measure of the amount of short wave radiation reflected from the earth back into the atmosphere, and is a function of vegetative cover, snow cover or water. Representative values are:

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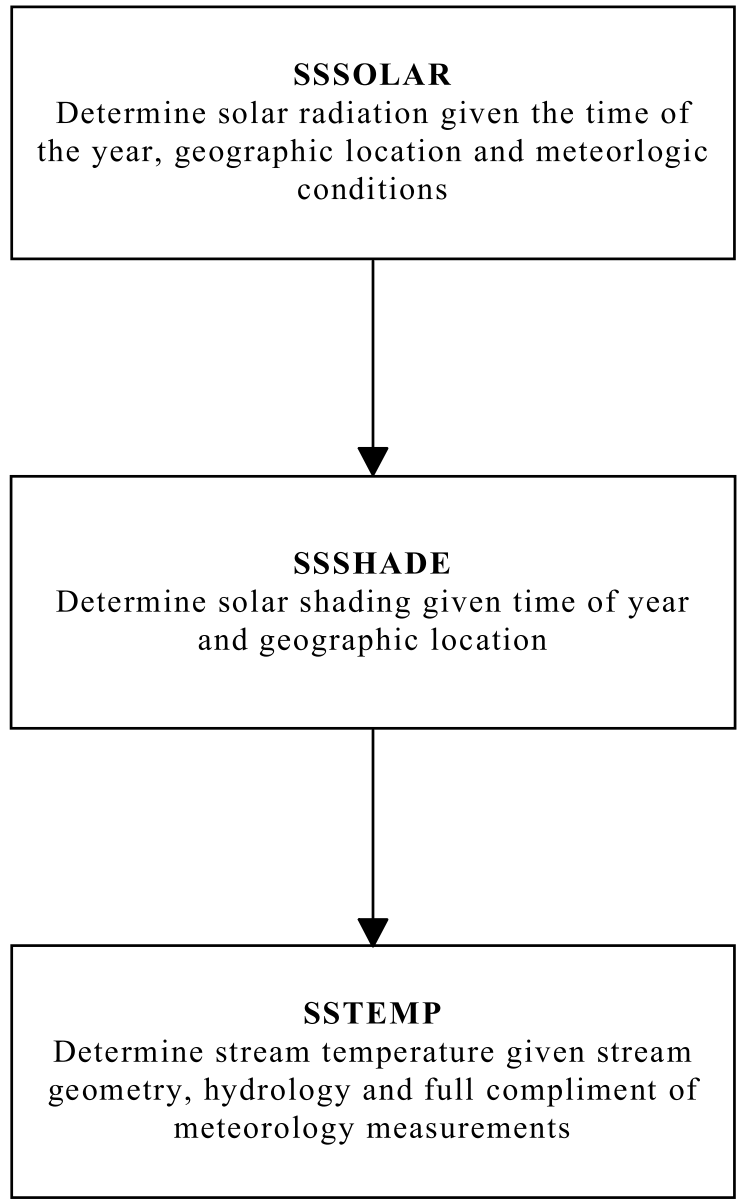
[3] **US Geological Survey, Biological Resource Division, Midcontinent Ecological Science Center, River Systems Management Section, Fort Collins, CO, 1997. *The Stream Segment and Stream Temperature Models, Version 1.0*, pp. 37-39**

Figure 3. Model Components



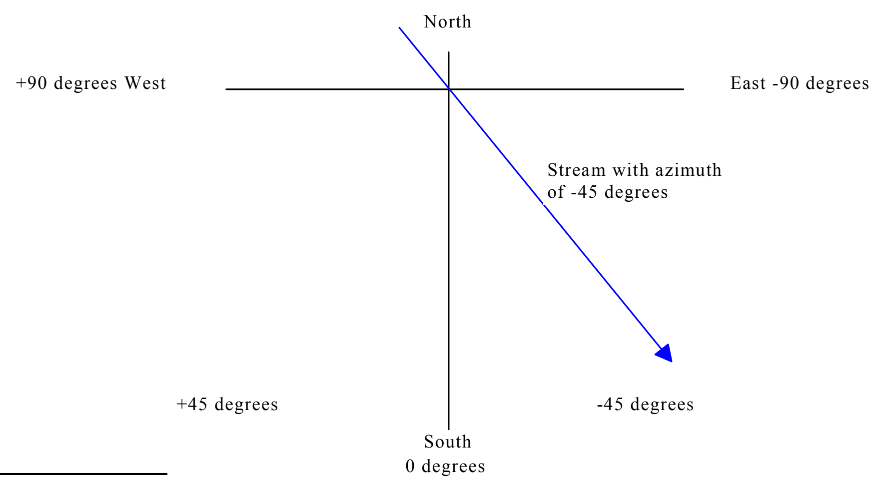
Meadows and fields	14
Leaf and needle forest	5 to 20
Dark, extended mixed forest	4 to 5
Heath	10
Flat ground, grass covered	15 to 33
Flat ground, rock	12 to 15
Flat ground, tilled soil	15 to 30
Sand	10 to 20
Vegetation, early summer	19
Vegetation, late summer	29
Fresh snow	80 to 90
Old snow	60 to 80
Melting snow	40 to 60
Ice	40 to 50
Water	5 to 15

The short wave radiation units are shown in Joules per square meter per second and in Langleys per day. The latter is the common English measurement unit. The values to be carried into **SSTEMP** are the radiation penetrating the water and the daylight hours.

Determining Solar Shading (SSSHADE)[4]

To parameterize the model, follow the procedure outlined below:

Latitude (degrees and minutes) – Latitude refers to the position of the stream segment on the earth's surface relative to the equator. It may be read from any standard topographic map. You should enter both degrees and minutes in the spaces provided.
Azimuth (degrees) – Azimuth refers to the general orientation of the stream segment with respect to due South and controls the convention of which side of the stream is East or West. A stream running North-South would have an azimuth of 0°. A stream running Northwest-Southeast would have an azimuth of –45 degrees. The direction of flow does not matter. Refer to the following diagram for guidance:



[4] **US Geological Survey, Biological Resource Division, Midcontinent Ecological Science Center, River Systems Management Section, Fort Collins, CO, 1997. *The Stream Segment and Stream Temperature Models, Version 1.0*, pp. 40-44**

Once the azimuth is determined, usually from the topographic map, the East and West sides are fixed by convention.

Width (feet) – Refer to the average width of the stream from water's edge to water's edge for the appropriate time of the year. Note that the width and vegetative offset should usually be changed in tandem.
Month – Enter the number of the month to be modeled.
Day – Enter the number of the day of the month to be modeled. This program's output is for a single day. To compute an average shade value for a longer period (up to one month) use the middle day of that period. The error will usually be less than one percent.
Topographic Altitude (degrees) – This is a measure of the average incline to the horizon from the middle of the stream. Enter a value for both East and West sides. The altitude may be measured with a clinometer or estimated from topographic maps. In hilly country, topographic maps may suffice.
Vegetative Height (feet) – This is the average height for the shade-producing level of vegetation measured from the water's surface.
Vegetation Crown (feet) – This is the average maximum crown diameter for the shade-producing level of vegetation along the stream.
Vegetation Offset (feet) – This is the average offset of the stems of the shade-producing level of vegetation from the water's edge.
Vegetation Density (percent) – This is the average screening factor (0 to 100%) of the shade-producing level of vegetation along the stream. It is composed of two parts: the continuity of the vegetative coverage along the stream (quantity), and the percent of light filtered by the vegetation's leaves and trunks (quality).

For example, if there is vegetation along 25% of the stream and the average density of that coverage is 85%, the total vegetative density is .25 times .85, which equals .2125, or 21.25%. The value should always be between 0 and 100%.

To give examples of shade quality, an open pine stand provides about 65% light filtering; a closed pine stand provides about 75% light removal; relatively dense willow or deciduous stands remove about 85% of the light; a tight spruce/fir stand provides about 95% light removal. Areas of extensive, dense emergent vegetation should be considered 90% efficient for the surface area covered.

The program will predict the total segment shading for the set of variables you provide. The program will also display how much of the total shade is a result of topography and how much is a result of vegetation. The topographic shade and vegetative shade are added to provide total shade. However, one should think of topographic shade as always being dominant in the sense that topography always intercepts radiation first, and then the vegetation intercepts what is left. It is total segment shade that is carried forward into the **SSTEMP** program.

Determine Resulting Stream Temperatures (SSTEMP)[5]

To parameterize the model, follow the procedure outlined below:

Segment Inflow (cfs or cms) – Enter the mean daily flow at the top of the stream segment. If the segment begins at a true headwater, the flow may be entered as zero; all accumulated flow will accrue from lateral (groundwater) inflow. If the segment begins at a reservoir, the flow will be outflow from the reservoir. The model assumes steady-state flow conditions.

Inflow Temperature (°F or °C) – Enter the mean daily water temperature at the top of the segment. If the segment begins at a true headwater, you may enter any water temperature because zero flow has zero heat. If there is a reservoir at the inflow, use the reservoir release temperature. Otherwise, use the outflow temperature from the upstream segment.

Segment Outflow (cfs or cms) – The program calculates the lateral discharge by knowing the flow at the head and tail of the segment, subtracting to obtain the net difference, and dividing by segment length. The program assumes that lateral inflow (or outflow) is uniformly apportioned through the length of the segment. If any "major" tributaries enter the segment, divide the segment into subsections between such tributaries. "Major" is defined as any stream contributing greater than 10% of the main stem flow.

Lateral Temperature (°F or °C) – The temperature of the lateral inflow, barring tributaries, should be the same as the groundwater temperature. In turn, groundwater temperature is often very close to the mean annual air temperature. This can be verified this by checking USGS well log temperatures. Obvious exceptions may arise in areas of geothermal activity. If irrigation return flows make up most of the lateral flow, they may be warmer than mean annual air temperature. Equilibrium temperatures may approximate return flow temperature.

Segment Length (miles or kilometers) – Enter the length of the segment for which you want to predict the outflow temperature.

Manning's n (dimensionless) – Manning's n is an empirical measure of the stream's "roughness." A generally acceptable default value is 0.035. The variable is necessary only if you are interested in predicting the minimum and maximum daily fluctuation in temperatures. This variable is not used in the prediction of the mean daily water temperature, and the model is not a particularly sensitive to it.

Elevation Upstream (feet or meters) – Enter the elevation as taken from a 7-1/2 minute quadrangle map.

Elevation Downstream (feet or meters) - Enter the elevation as taken from a 7-1/2 minute quadrangle topographic map.

Width's A Term (dimensionless) – This variable is derived through the relationship of wetted width versus discharge relationship. To conceptualize this, plot the width of the segment on the Y-axis and discharge on the X-axis. Three or more measurements are much better than two.

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[5] **US Geological Survey, Biological Resource Division, Midcontinent Ecological Science Center, River Systems Management Section, Fort Collins, CO, 1997. *__The Stream Segment and Stream Temperature Models, Version 1.0__*, pp. 44-49**

The relationship should approximate a straight line, the slope of which is the B term. Substitution of the stream's actual wetted width for the A term will result if the B term is equal to zero. This is satisfactory if you will not be varying the flow, and thus the stream width, very much in your simulations. If, however, you will be changing the flow by a factor of 10 or so, then the A and B terms are addressed more precisely.

Width's B Term (dimensionless) – The B term is calculated by linear measurements from the above mentioned plot. A good estimate in the absence of anything better is 0.20 (Leopold, 1964).

Thermal Gradient (Joules/Meter^2/Second/°C) – This quantity is a measure of the rate of thermal flux from the streambed to the water. The model is not particularly sensitive to this variable. The default value is 1.65.

Air Temperature (°F or °C) – Enter the mean daily air temperature. This and the following meteorological variables may come from weather reports which can be obtained for a weather station near the site (see Appendix D).

Relative Humidity (percent) – Obtain the mean daily relative humidity for the area by measurement or from the weather service.

Wind Speed (miles/hour or meters/second) – Measure or obtain from the weather service.

Percent Possible Sun (percent) – This variable is an indirect measure of cloud cover. Ten percent cloud cover is 90% possible sun. Estimates are available from the weather service or can be directly measured.

Solar Radiation (Langleys/day or Joules/meter^2/second) – Enter the results from the **SSSOLAR** program. If you use a source other than SSSOLAR (such as Cinquemani 1978), you should assume that approximately 93% of the ground-level solar radiation actually enters the water; the rest is assumed to be reflected. Thus, multiply any recorded ground-level solar measurements by 0.93 to calculate the radiation actually entering the water.

Daylight Length (hours) – Adjust the time between sunrise and sunset for the time of year. You may use the **SSSOLAR** program to calculate this.

Segment Shading (percent) – This variable refers to how much of the segment is shaded by vegetation, cliffs, etc. If 10% of the water surface is shaded, enter 10. To be accurate, the **SSSHADE** model should be used to predict the actual shading value based on topography, vegetative coverage and vegetative density. In lieu of using the **SSSHADE** model, you may think of the shade factor as being the average percent of water surface shaded throughout the day. In actuality, shade represents the percent of the incoming solar radiation that does not reach the water.

Ground Temperature (°F or °C) – Use mean annual air temperature from the weather service.

Dam at Inflow (Yes = 1 No = 0) – If a reservoir is supplying the inflow, enter a 1, otherwise, enter a 0.

The maximum daily water temperature is calculated by following a parcel of water from solar noon at the top of the stream segment to the end of the segment, allowing it to heat up towards the maximum equilibrium temperature. If there is an upstream reservoir or spring that is the source of constant temperature water, and the distance upstream is less than the distance traveled by the water parcel from solar noon to the end of the segment, the water parcel from the dam's discharge is heated instead of the water parcel a full half-day's travel upstream.

With the stream segment's meteorology and geometry supplied as variables, the distance upstream through which the water column travels can be defined.

The program will predict the 24-hour minimum, mean and maximum daily water temperature for the set of variables provided. The theoretical basis for the model is strongest for the mean daily temperature. The maximum daily temperature varies as a function of several different factors.

The mean daily equilibrium temperature is that temperature which the mean daily water temperature will approach if all conditions remain the same as the water parcel travels downstream. Of course, all conditions cannot remain the same, since the elevation changes immediately.

The maximum daily equilibrium temperature is that temperature which the maximum daily water temperature will approach.

Other results include the intermediate variables average width, average depth and slope, calculated from the twenty input variables, and the heat flux components. These heat flux components are abbreviated in the program's output as follows:

ATM	=	atmospheric component
CVN	=	convection component
CDN	=	conduction component
EVP	=	evaporation component
FRC	=	friction component
SOL	=	solar radiation component
VEG	=	vegetative radiation component
WAT	=	water's back radiation component

Assumptions and Limitations[6]

There are several assumptions that apply to SSTEMP. These assumptions in turn dictate the limitations in terms of model applications.

First, SSTEMP is a steady state model. It assumes that the conditions being simulated involve only steady flow – no hydropeaking can be simulated unless the flows are essentially constant for the entire averaging period. The minimum average period is one day. Similarly, the boundary conditions of SSTEMP are assumed homogeneous and constant. This has implications for the maximum size of the network simulated for a single averaging period.

Second, SSTEMP assumes homogeneous and instantaneous mixing wherever two sources of water are combined. There is no lateral or vertical temperature distribution (or dispersion/diffusion), represented in the model.

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[6] **US Geological Survey, Biological Resource Division, Midcontinent Ecological Science Center, River Systems Management Section, Fort Collins, CO, 1997. *The Stream Segment and Stream Temperature Models, Version 1.0*, pp. 26-27**

Third, SSTEMP itself is meant solely for stream temperature predictions. It will not handle stratified reservoirs, though river-run reservoirs with equilibrium releases may be simulated.

Fourth, SSTEMP is not a hydrology model. It should be relied on to distribute flows in an ungaged network. That is often an additional, non-temperature model task.

Fifth, SSTEMP may not be reliable in very cold conditions, i.e., water temperatures less than 4°C. It is not meant for ice or the like.

Finally, SSTEMP have been tested only in the northern hemisphere.

Temperature Allocations as Determined by Percent (%) Shade

The model run output table details results of the three-month model run from July 1 through September 1 for the South Fork of Negrito Creek (see also Appendix B). As the percent total shade is increased, the maximum 24-hour temperature decreases until the segment specific standard (20°C, 68°F) is achieved. On the South Fork of Negrito Creek, this occurs when the percent total shade is 87% and higher.

The actual load allocation (LA) of 38.2 joules/meter^2/second/day is achieved at 88.3% shade or higher according to the model runs.

Linkage of Water Quality and Pollutant Sources

Potential pollutant sources are documented in Appendix E. Decreased stream shading is a predicable result of reduced riparian vegetation. When canopy densities are compromised, thermal loading increases in response to the increase in incident solar radiation. Likewise, it is well documented that many past hydromodification activities have lead to channel widening. The resultant increase in the channels width to depth ratio increases the water surface area available for heat exchange. A stream that is wide and shallow has a greater heat exchange potential, than one that is narrow and deep.

South Fork of Negrito Creek at FR 141

Although anthropogenic disturbance effecting riparian canopy densities, width to depth ratios, and/or discharge rates are well documented, the complex task of identifying and quantifying each individual thermal loading contribution, has yet to be accomplished. As a result, the probable sources of this threat to designated uses are listed as removal of riparian vegetation (see Figure 4).

South Fork of Negrito Creek

Riparian vegetation, stream morphology, hydrology, climate, geographic location and aspect influence stream temperature.

Although climate and geographic location and aspect are outside of human control, the condition of the riparian area, channel morphology and hydrology can be affected by land use activities.

Specifically, the elevated summertime stream temperatures attributable to anthropogenic causes in the South Fork of Negrito Creek can result from the following conditions:

1. Channel widening (increased width to depth ratios) increases the stream surface area exposed to incident solar radiation,

2. Riparian vegetation disturbance reduces stream surface shading, riparian vegetation height and density,

3. Reduced summertime base flows. Base flows are maintained with a functioning riparian system so that loss of riparian will lower and sometimes eliminate base flows. Although removal of upland vegetation has been shown to increase water yield, studies show that removal of riparian vegetation along the stream channel subjects the water surface and adjacent saturated soil surfaces to wind and solar radiation, partially offsetting the reduction in transpiration with evaporation. In losing stream reaches, increased stream temperatures can result in increased streambed infiltration which can result in lower base flow (Constantz et al., 1994).

Analysis presented in this TMDL will demonstrate that defined loading capacities will ensure attainment of State water quality standards.

Specifically, the relationship between shade, solar radiation, and water quality attainment will be demonstrated. Vegetation density increases will provide necessary shading, as well as encourage bank-building processes in severe hydrologic events.

Margin of Safety (MOS)

The federal Clean Water Act (CWA) requires that each TMDL be calculated with margin of safety (MOS). This statutory requirement that TMDLs incorporate a MOS is intended to account for uncertainty in available data or in the actual effect controls will have on loading reductions and receiving water quality. A MOS may be expressed as unallocated assimilative capacity or conservative analytical assumptions used in establishing the TMDL (e.g., derivation of numeric targets, modeling assumptions or effectiveness of proposed management actions).

The MOS may be implicit, utilizing conservative assumptions for calculation of the loading capacity, WLAs and LAs. The MOS may also be explicitly stated as an added separate quantity in the TMDL calculation.

In the development of this temperature TMDL, the following conservative assumptions were used to parameterize the model:

- Warmest time of the year was used in the modeling due to the seasonality of temperature exceedances (July 1 through September 1).

  The average 1998 monthly ambient air temperatures for July, August, and September were calculated from weather station data (see Appendix D),

  A thermograph was deployed to document the mean daily water temperature above the North Fork Negrito confluence (see Appendix A), and
  Actual elevation and latitude/longitude were determined by using a global positioning system (GPS) at the site.

- Measured, average discharge for this segment, for base flow conditions was used (see Appendix C).

- Stream channel geomorphology was used to determine the level of functionality of the stream along with other physical field measurements that were used in the modeling process. Actual wetted-width of the stream was used.

- Response of receiving waters under various allocation scenarios

  Different scenarios were used to show the sensitivity of water temperatures to variable shading

- Expression of analysis results in ranges

  Analysis results provide a range of temperature outputs

Because of the high quality of data and information that was gathered, and the continuous field monitoring data used to verify these model outputs, an explicit MOS of **10%** is assigned to this TMDL.

Three Month Summer Model Run on the South Fork of Negrito Creek-July through September

<table>
<tr><th>Rosgen Channel Class</th><th>WQS (HQCWF)</th><th>Model Run Dates</th><th>Segment Length (mi)</th><th>Solar Radiation Component per 24-Hours (+/-)</th><th>% Total Shade
(SSSHADE)</th><th>% Topo Shade</th><th>% Veg Shade</th><th>Temperature °F (24 hour)
(SSTEMP)</th><th>Temperature °C (24 hour)
(SSTEMP)</th></tr>
<tr><td>F Stream Type</td><td>20°C (68°F)</td><td>July 1 thru Sept 1</td><td>5.4</td><td>Current Field Condition
+326.76 joules/meter^2/ second</td><td>25</td><td>19</td><td>6</td><td>Minimum 58.04
Mean 70.90
Maximum 83.77</td><td>Minimum 14.47
Mean 21.61
Maximum 28.76</td></tr>
<tr><td colspan="4" rowspan="4">Stream Segment Temperature Model (SSTEMP)

TEMPERATURE ALLOCATIONS AS DETERMINED BY % SHADE ON South Fork Negrito

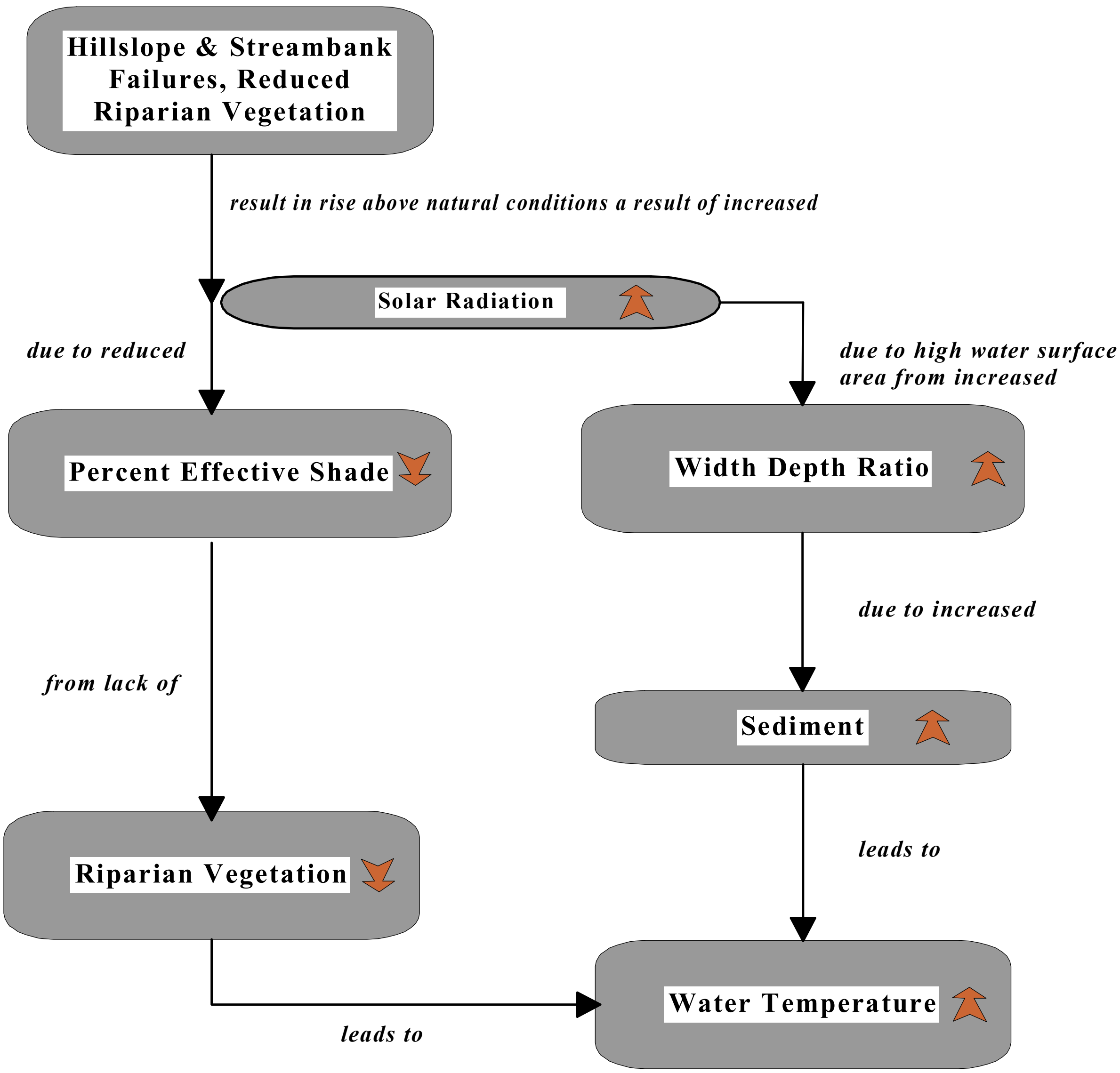
* DENOTES 24 HOUR ACHIEVEMENT OF SURFACE WATER QUALITY STANDARD FOR TEMPERATURE

Actual Reduction in Solar Load to this Stream to meet the State surface water quality standard is:

326.76 joules/meter^2/second (current condition) – 38.2 joules/meter^2/second (88.3% shaded water)
=
288.56 joules/meter^2/second

♦ Denotes the achievement of the 38.2 joules/meter^2/second load allocation (LA)</td><td>+212.5 joules/meter^2/ second</td><td>35</td><td>19</td><td>16</td><td>Minimum 57.90
Mean 69.62
Maximum 81.34</td><td>Minimum 14.38
Mean 20.9
Maximum 27.41</td></tr>
<tr><td>+147.1 joules/meter^2/ second</td><td>55</td><td>19</td><td>36</td><td>Minimum 57.84
Mean 67.01
Maximum 76.18</td><td>Minimum 14.36
Mean 19.45
Maximum 24.54</td></tr>
<tr><td>* +42.5 joules/meter^2/ second</td><td>87</td><td>19</td><td>68</td><td>Minimum 58.28
Mean 62.70
Maximum 67.12</td><td>Minimum 14.6
Mean 17.06
Maximum 19.51</td></tr>
<tr><td>♦+38.2 joules/meter^2/ second</td><td>88.3</td><td>19</td><td>69.3</td><td>Minimum 58.31
Mean 62.52
Maximum 66.73</td><td>Minimum 14.62
Mean 16.96
Maximum 19.29</td></tr>
</table>

Figure 4. Factors that Impact Water Temperature



Consideration of Seasonal Variation

Section 303(d)(1) of the CWA requires TMDLs to be, "established at a level necessary to implement the applicable water quality standard with seasonal variation." Both stream temperature and flow vary seasonally and from year to year. Water temperatures are coolest in winter and early spring months.

Thermograph records show that temperatures exceed State water quality standards in the summer months. Warmest stream temperatures corresponded to prolonged solar radiation exposure: warm air temperature and base flow conditions. These conditions occur during late summer and promote the warmest seasonal in stream temperatures.

Future Growth

Estimations of future growth are not anticipated to lead to a significant increase for temperature that cannot be controlled with best management practice implementation in this watershed.

Monitoring Plan

Pursuant to Section 106(e)(1) of the CWA, the SWQB has established appropriate monitoring methods, systems and procedures in order to compile and analyze data on the quality of the waters of New Mexico. In accordance with the New Mexico Water Quality Act, the SWQB has developed and implemented a comprehensive water quality monitoring strategy for the surface waters of the State. The monitoring strategy establishes the methods of identifying and prioritizing water quality data needs, specifies procedures for acquiring and managing water quality data, and describes how these data are used to progress toward three basic monitoring objectives: to develop water quality-based controls, to evaluate the effectiveness of controls and to conduct water quality assessments.

In order to optimize the efficiency of this monitoring effort necessary to support the development of TMDLs, the SWQB has adopted a rotating basin monitoring strategy. This strategy is based on a five to seven year return interval. The actual watersheds monitored in any given year will be determined as a function of the priorities specified below.

Current priorities for monitoring in the SWQB are determined by utilizing the following documents:

- 303(d) consent decree (***Forest Guardians and Southwest Environmental Center v. Carol Browner, Administrator, U.S. Environmental Protection Agency***, Civil Action No. 96-0826 LH/LFG)
- 303(d) settlement agreement MOU
- Clean Water Action Plan (CWAP)
- Unified Watershed Assessment (UWA)

Short-term efforts will be directed toward those waters which are on the EPA TMDL consent decree list and which are due within the first two years of the consent decree schedule.

Once assessment monitoring is completed, those reaches still showing impacts and requiring a TMDL will be targeted for more intensive monitoring. Methods of data acquisition include fixed-station monitoring, intensive surveys of priority water bodies including biological assessments, and compliance monitoring of industrial, federal and municipal point sources.

Long term monitoring for assessments will be accomplished through the establishment of sampling sites that are representative of the water body and which can be revisited every five to seven years.

This information will provide time relevant information for use in 305(b) assessments and to support the need for developing TMDLs.

The approach provides:

- An unbiased assessment of the water body and establishes a long term monitoring record for trend analyses.
- A systematic, detailed review of water quality data and allows for a more efficient use of resources.
- Information at a scale useful to the implementation of corrective activities.
- An established order of rotation and predictable sampling in each basin. This allows easier coordination efforts with other programs and water quality entities.
- Enhanced program efficiency and improved basis for management decisions.

It should be noted that a basin would not be ignored during its five to seven year intensive sampling rotation. The sampling program is supplemented with other data collection efforts, which are classified as field studies. The interim will be used to analyze data; conduct field studies to further characterize identified problems, and develop TMDLs and implement corrective actions. Both types of monitoring, long term and field studies, contribute to the 305(b) report and 303(d) listing processes. The SWQB maintains current quality assurance and quality control plans to cover all monitoring activities. This document ***"Quality Assurance Project Plan for Water Quality Management Programs"*** is updated and certified annually by US EPA Region 6. In addition, the SWQB identifies the data quality objectives required to provide information of sufficient quality to meet the established goals of the program.

The following draft schedule is a draft for sampling seasons through 2004 and will be done in a consistent manner to support the New Mexico Unified Watershed Assessment (UWA) and the Nonpoint Source Management Program. This sampling regime will reflect seasonal variation and includes sampling in spring, summer, and fall for each of the watersheds.

- 1998 Jemez Watershed, Upper Chama Watershed (above El Vado), Cimarron Watershed, Santa Fe River, San Francisco Watershed
- 1999 Lower Chama Watershed, Red River Watershed, Middle Rio Grande, Gila River Watershed (summer and fall), Santa Fe River
- 2000 Gila River Watershed (spring), Dry Cimarron Watershed, Upper Rio Grande 1 (Pilar north to the NM/CO border), Shumway Arroyo

- 2001 Upper Rio Grande 2 (Pilar south to Cochiti Reservoir), Upper Pecos Watershed (Ft Sumner north to the headwaters)
- 2002 Canadian River Watershed, San Juan River Watershed, Mimbres Watershed
- 2003 Lower Pecos Watershed (Ft. Sumner south to the NM/TX border including Ruidoso), Lower Rio Grande (southern border of Isleta Pueblo south to the NM/TX border)
- 2004 Rio Puerco Watershed, Closed Basins, Zuni Watershed

Implementation Plan

Management Measures

Management measures are economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, citing criteria, operating methods, or other alternatives (USEPA, 1993). A combination of best management practices (BMPs) will be used to implement this TMDL. Stakeholder and public outreach and involvement in the implementation of this TMDL will be ongoing. Stakeholder participation will include both choosing and installing BMPs, as well as participation in volunteer monitoring.

Introduction

Water temperature influences the metabolism, behavior, and mortality of fish and other aquatic organisms that affect fish. Natural temperatures of a waterbody fluctuate daily and seasonally. These natural fluctuations do not eliminate indigenous populations, but may affect existing community structure and geographical distribution of species. Anthropogenic impacts can lead to modifications of these natural temperature cycles, often leading to deleterious impacts on the fishery.

The following are examples of sources that can cause temperature exceedances:

- Lack of shading caused by removal of riparian vegetation,
- Streambank destabilization,
- Reduced base flows caused by such activities as removal of riparian vegetation and manipulation of flows by dams,
- Excessive turbidity, and
- Alterations in stream geomorphology. This can occur when the natural scouring process leads to degradation, or excessive sediment deposition results in aggradation. Both of these processes can lead to a high width/depth ratio (wider, shallower streams)

Actions to be Taken

For this watershed the primary focus will be on the control of temperature.

During the TMDL process in this watershed, point sources have been reviewed and will be addressed through the permit process. The nonpoint source contributions will need to address temperature exceedances through BMP implementation.

There are a number of BMPs that can be utilized to address temperature, depending on the source of the problem. Such BMPs include:

1. The planting of woody riparian species applicable to the affected area provides canopy cover and shading for temperature control and helps prevent streambank destabilization. The woody vegetation provides structure to the bank and reduces stream velocities thereby preventing excessive streambank erosion. (A Streambank Stabilization and Management Guide for Pennsylvania Landowners, 1986, State of Pennsylvania;

2. River restoration involving such actions as reconfiguration of the river's sinuosity, installation of root wads to stabilize cut banks, and riparian plantings aid in halting bank erosion and the processes of degradation and aggradations and facilitate the return of the river to a natural and stable morphology which incorporates a lower width to depth ratio. This lowered ratio means that the stream has become narrower and deeper. Thus, the stream can maintain cooler temperatures with the increased channel depth and reduced water surface exposed to solar radiation. (A Geomorphological Approach to Restoration of Incised Rivers, 1997, Rosgen, David);

3. The relocation of recreation sites out of riparian areas as well as the closure and rehabilitation of former recreation sites located in riparian areas will help restore riparian vegetation for shading and will eliminate a source of sediment, (Stream Corridor Restoration – Principles, Processes, and Practices, 1998, The Federal Interagency Stream Restoration Working Group).

Additional sources of information for possible BMPs to address temperature are listed below. Some of these documents are available for viewing at the New Mexico Environment Department, Surface Water Quality Bureau, Watershed Protection Section Library, 1190 St Francis Drive, Santa Fe New Mexico.

Agriculture

- Internet websites:
http://www.nm.nrcs.usda.gov/

- Bureau of Land Management, 1990, Cows, Creeks, and Cooperation: Three Colorado Success Stories. Colorado State Office.

- Cotton, Scott E. and Ann Cotton, Wyoming CRM: Enhancing our Environment.

- Goodloe, Sid and Susan Alexander, Watershed Restoration through Integrated Resource Management on Public and Private Rangelands.

- Grazing in New Mexico and the Rio Puerco Valley Bibliography.

- USEPA and The Northwest Resource Information Center, Inc., 1990, Livestock Grazing on Western Riparian Areas.

- USEPA and The Northwest Resource Information Center, Inc., 1993, Managing Change: Livestock Grazing on Western Riparian Areas.

Forestry

- New Mexico Natural Resources Department, 1983, Water Quality Protection Guidelines for Forestry Operations in New Mexico.

- New Mexico Department of Natural Resources, 1980, New Mexico Forest Practice Guidelines. Forestry Division, Timber Management Section

- State of Alabama. 1993. Alabama's Best Management Practices for Forestry.

Riparian and Streambank Stabilization

- Colorado Department of Natural Resources, Streambank Protection Alternatives. State Soil Conservation Board.

- Meyer, Mary Elizabeth, 1989, A Low Cost Brush Deflection System for Bank Stabilization and Revegetation.

- Missouri Department of Conservation, Restoring Stream Banks With Willows, (pamphlet).

- New Mexico State University, Revegetating Southwest Riparian Areas, College of Agriculture and Home Economics, Cooperative Extension Service, (pamphlet).
- State of Pennsylvania, 1986, A Streambank Stabilization And Management Guide for Pennsylvania Landowners. Department of Environmental Resources, Division of Scenic Rivers.

- State of Tennessee, 1995, Riparian Restoration and Streamside Erosion Control Handbook. Nonpoint Source Water Pollution Management Program.

Roads

- Becker, Burton C. and Thomas Mills, 1972, Guidelines for Erosion and Sediment Control Planning and Implementation, Maryland Department of Water Resources, # R2-72-015.

- Bennett, Francis William, and Roy Donahue, 1975, Methods of Quickly Vegetating Soils of Low Productivity, Construction Activities, US EPA, Office of Water Planning and Standards Report # 440/9-75-006.

- Hopkins, Homer T. and others, Processes, Procedures, and Methods to control Pollution Resulting from all Construction Activity, US EPA Office of Air and Water Programs, EPA Report 430/9-73-007.

- New Mexico Natural Resources Department, 1983, Reducing Erosion from Unpaved Rural Roads in New Mexico, A Guide to Road construction and Maintenance Practices. Soil and Water Conservation Division

- New Mexico State Highway and Transportation Department and USDA-Soil Conservation Service, Roadside Vegetation Management Handbook.

- New Mexico Environment Department, 1993, Erosion and Sediment Control Manual. Surface Water Quality Bureau.

- USDA Forest Service Southwestern Region, 1996, Managing Roads for Wet Meadow Ecosystem Recovery. FHWA-FLP-96-016.

  Section V. New Construction and Reconstruction
  Section VI. Remedial Treatments
  Section VII. Maintenance

- USEPA, 1992, Rural Roads: Pollution Prevention and Control Measures (handout).

Storm Water

- Delaware Department of Natural Resources and Environmental Control, 1997, Conservation Design for Stormwater Management: A Design Approach to Reduce Stormwater Impacts From Land Development and Achieve Multiple Objectives Related to Land Use. Sediment and Stormwater Program and The Environment Management Center, Brandywine Conservancy.

- State of Kentucky, 1994, Kentucky Best Management Practices for Construction Activity. Division of Conservation and Division of Water.

- USEPA, 1992, Storm Water Management for Construction Activities – Developing Pollution Prevention Plans and Best Management Practices, Summary Guidance, EPA 833-R-92-001, pgs. 7- 9.

Miscellaneous

- Interagency Baer Team, 2000, Cerro Grande Fire Burned Area Emergency Rehabilitation (BAER) Plan, Section F. Specifications.

- New Mexico Environment Department, 2000, A Guide to Successful Watershed Health. Surface Water Quality Bureau.

- Roley, William Jr., Watershed Management and Sediment Control for Ecological Restoration.

- Rosgen, David, 1996, Applied River Morphology, Chapter 8. Applications (Grazing, Fish Habitat).

- Rosgen, David, 1997, A Geomorphological Approach to Restoration of Incised Rivers.

- The Federal Interagency Stream Restoration Working Group, 1998, Stream Corridor Restoration. Principles, Processes, and Practices.

  Chapter 8 – Restoration Design
  Chapter 9 – Restoration implementation, Monitoring, and Management

- USDA Forest Service Southwestern Region, Soil and Water Conservation Practices Handbook.

  Section 22, Range Management
  Section 23, Recreation Management
  Section 24, Timber Management
  Section 25, Watershed Management
  Section 26, Wildlife and Fisheries Management
  Section 41, Access and Transportation Systems and Facilities

- Unknown, Selecting BMPs and other Pollution Control Measures.

- Unknown, Environmental Management. Best Management Practices.
  Construction Sites
  Developed Areas
  Sand and Gravel Pits
  Farms, Golf Courses, and Lawns

Implementation of this TMDL will consist of three main phases:

1. Temperature baseline verification monitoring
2. BMP implementation
3. Effectiveness monitoring

1. Temperature Baseline Verification Monitoring

Temperature baseline verification monitoring began July 1, 1998 and ran until September 28, 1998. Thermographs were set to read every hour in order to document diurnal fluctuations in the system (see Appendix A).

This verification monitoring consists of baseline data collection, verification of current conditions including identification of priority sites for BMP implementation and identification of monitoring locations which will be necessary in order to accurately measure improvements.

SWQB has conducted the following baseline verification monitoring activities as part of this phase:

- Establishment of photo documentation points
- Establishment of monitoring sites
- Collection of baseline data including:
  water chemistry, total dissolved solids (TDS), total suspended solids (TSS), turbidity, dissolved oxygen (DO), anion/cation, conductivity, temperature, canopy density (stream shade), cross channel profiles, pebble count, percent fines and embeddedness.

Once baseline verification monitoring has been completed, the BMP implementation phase will begin.

2. Potential South Fork of Negrito Creek Project BMPs and their Anticipated Contribution to Load Reduction

1) **Riparian Revegetation (plantings)**
   Increased canopy cover, decreased width to depth ratio, and improved stream bank stability. Decreased peak water temperatures. Riparian Plantings to consist of native *Salix* (willow), Populus (cottonwood), and/or *Alnus* (alder) for maximum crown diameter.

2) **Riparian Fencing**
   Provides protection for heavily impacted areas and/or newly rehabilitated segments. Accelerates recovery of vegetation resources and channel width to depth ratios.

Decisions regarding the applicability and placement and individual BMPs will be made on a site-specific basis. SWQB encourages public/private landowners and volunteers to become involved and assist in all phases of BMP implementation.

3. BMP Effectiveness Monitoring

The currently approved Quality Assurance Project Plan (QAPP) and Nonpoint Source (NPS) Standard Operating Procedures (SOP) methods will be used for all sampling and monitoring for this project. In order to estimate BMP effectiveness, monitoring efforts will focus on the appropriate physical components of the stream system.

The following physical parameters will be monitored in order to evaluate the effectiveness of BMP's:

- **Cross Channel Profiles**
  These profiles will be established in key locations to measure changes in channel morphology and width: depth ratios. Natural stream channel stability is achieved by allowing the river to develop a stable dimension, pattern and profile such that, over time, channel features are maintained and the stream system neither aggrades nor degrades.

- **Riparian Canopy Densities**
  Density will be measured at fixed locations to determine quantifiable differences in stream shade.

- **Photo Documentation Points**
  Photographs will be used to evaluate the success of revegetation efforts and to document changes in channel morphology.

It is recognized that measurable changes in these parameters will require some time to occur. The Bureau views all monitoring as an ongoing activity and will continue to document anticipated changes in the temperature on the South Fork of Negrito Creek.

Other BMP Activities in the Watershed

The following are activities in this watershed that have occurred, are occurring, or are in the planning stages to address sources which can increase the stream's temperature or other nonpoint source issues in the Negrito Creek Watershed, which includes the South Fork of Negrito Creek.

The Gila National Forest has been and continues to be involved in management activities on lands in the upper reaches of the Negrito Creek watershed. Many of these management activities are undertaken to address issues with sediment, turbidity, and water temperature. Grazing and logging were all historic uses made of the land. Currently, the area is forestry and privately managed with an emphasis focused on recreation, wildlife, fisheries and grazing.

Currently, the Forest Service and private landowners actively manage grazing activities, which impact this 5.4-mile segment of the South Fork of Negrito Creek. Elk graze the area heavily, with large populations observed during the sampling period in this TMDL. Riparian cattle fencing and elk exclosures are recommended, which are prerequisite to willow planting, which is also planned.

The upper watershed along this TMDL segment has numerous gullies, spanning several allotments, which will, in the future, or have been checked either by earthen dams or gabion baskets. At the present time, private landowner management varies between holders. Private landowners are encouraged to re-seed and mitigate along riparian areas that have been affected by uncontrolled grazing.

Roads in this ecosystem are a primary source of erosion and sediment within this watershed. The INFRA Travel Routes Database estimates a road density of 1.9 miles per square mile. In places, existing system roads have impacted the channel by reducing the meander pattern, and encouraging widening. Recommendations are to address unused, and non-maintained roads that serve as water crossings.

Lastly, the Gila National Forest is planning prescribed burning and timber stand improvements, namely thinning, in the Negrito Creek watershed to reduce fuels and improve watershed conditions and wildlife habitat. These efforts will continue within program priorities and funding levels.

Coordination

In this watershed public awareness and involvement will be crucial to the successful implementation of this plan and improved water quality. The WRAS (Watershed Restoration Action Strategy) is a written plan intended to provide a long-range vision for various activities and management of resources in a watershed. It includes opportunities for private landowners and public agencies in reducing and preventing impacts to water quality. This long-range strategy will become instrumental in coordinating and achieving a reduction of temperature and will be used to prevent water quality impacts in the watershed. SWQB staff will assist with any technical assistance such as selection and application of BMPs needed to meet the Gila National Forest's WRAS goals.

The SWQB will work with stakeholders in this watershed to encourage the implementation of BMPs such as pinon and juniper thinning in areas that have had excessive encroachment of these trees and which are an obvious source of surface runoff and gully formation. In addition the SWQB will encourage landowners to implement, if applicable, new grazing management to address riparian and watershed issues. Lastly, the SWQB will encourage all landowners in the watershed to address road issues such as dirt roads, and low water crossings, that have been constructed (or maintained) without proper drainage controls to prevent sediment from reaching watercourses and prevent hydro modification of those water crossings.

Stakeholders in this process will include the SWQB, and other members of the Watershed Restoration Action Strategy such as the Gila National Forest, Catron County Citizens Group, and other private landowners.

Implementation of BMPs within the watershed to reduce pollutant loading from nonpoint sources will be on a voluntary basis. Reductions from point sources will be addressed in revisions to discharge permits. Stakeholder public outreach and involvement in the implementation of this TMDL will be ongoing.

Time Line

Implementation Action	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Public Outreach and Involvement	X	X	X	X	X
Establish Milestones	X				
Secure Funding	X		X		
Implement Management Measures (BMPs)		X	X		
Monitor BMPs		X	X	X	
Determine BMP Effectiveness				X	X
Re-evaluate Milestones				X	X

Section 319(h) Funding Options

The Watershed Protection Section of the SWQB provides USEPA 319(h) funding to assist in implementation of BMPs to address water quality problems on reaches listed on the 303(d) list or which are located within Category I Watersheds as identified under the Unified Watershed Assessment of the Clean Water Action Plan.

These monies are available to all private, for profit, and nonprofit organizations that are authenticated legal entities, or governmental jurisdictions including: cities, counties, tribal entities, Federal agencies, or agencies of the State.

Proposals are submitted by applicants through a Request for Proposals (RFP) process and require a non-federal match of 40% of the total project cost consisting of funds and/or in-kind services. Further information on funding from the Clean Water Act, Section 319(h) can be found at the New Mexico Environment Department website: www.nmenv.state.nm.us.

Assurances

New Mexico's Water Quality Act (Act) does authorize the Water Quality Control Commission to "promulgate and publish regulations to prevent or abate water pollution in the state" and to require permits. The Act authorizes a constituent agency to take enforcement action against any person who violates a water quality standard. Several statutory provisions on nuisance law could also be applied to nonpoint source water pollution. The Water Quality Act (20 NMAC 6.2) (NMWQCC 1995a) also states in §74-6-12(a):

> *The Water Quality Act (this article) does not grant to the commission or to any other entity the power to take away or modify the property rights in water, nor is it the intention of the Water Quality Act to take away or modify such rights.*

In addition, the State of New Mexico Surface Water Quality Standards (see Section 1100E and Section 1105C) (NMWQCC 1995b) states*:*

> *These water quality standards do not grant the Commission or any other entity the power to create, take away or modify property rights in water.*

New Mexico policies are in accordance with the federal Clean Water Act §101(g):

> *It is the policy of Congress that the authority of each State to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired by this Act. It is the further policy of Congress that nothing in this Act shall be construed to supersede or abrogate rights to quantities of water, which have been established by any State.*
>
> *Federal agencies shall co-operate with State and local agencies to develop comprehensive solutions to prevent, reduce and eliminate pollution in concert with programs for managing water resources*.

New Mexico’s Clean Water Action Plan has been developed in a coordinated manner with the State’s 303(d) process. All Category I watersheds identified in New Mexico’s Unified Watershed Assessment process are totally coincident with the impaired waters lists for 1996 and 1998 as approved by EPA. The State has given a high priority for funding, assessment, and restoration activities to these watersheds.

The description of legal authorities for regulatory controls/management measures in New Mexico’s Water Quality Act does not contain enforceable prohibitions directly applicable to nonpoint sources of pollution.

The Act does authorize the Water Quality Control Commission to “promulgate and publish regulations to prevent or abate water pollution in the state” and to require permits. Several statutory provisions on nuisance law could also be applied to nonpoint source water pollution.

NMED nonpoint source water quality management utilizes a voluntary approach. The state provides technical support and grant monies for implementation of BMPs and other NPS prevention mechanisms through §319 of the Clean Water Act. Since portions of this TMDL will be implemented through NPS control mechanisms, the Bureau's Watershed Protection Section will target efforts to this and other watersheds with TMDLs. The Watershed Protection Section coordinates with the Nonpoint Source Taskforce. The Nonpoint Source Taskforce is the New Mexico statewide focus group representing federal and state agencies, local governments, tribes and pueblos, soil and water conservation districts, environmental organizations, industry, and the public.

This group meets on a quarterly basis to provide input on the §319 program process, to disseminate information to other stakeholders and the public regarding nonpoint source issues, to identify complementary programs and sources of funding, and to help review and rank §319 proposals. In order to obtain reasonable assurances for implementation in watersheds with multiple landowners, including Federal, State and private land, NMED has established Memoranda of Understanding (MOUs) with various Federal agencies, in particular the Forest Service and the Bureau of Land Management. MOUs have also been developed with other State agencies, such as the New Mexico State Highway and Transportation Department. These MOUs provide for coordination and consistency in dealing with nonpoint source issues.

The time required to attain standards in this case is estimated to be 5-10 years. Standards attainment is predicated on the following growth rates of the riparian species as follows:

Plant Species	Predicted Time to Maturity (years)
Willow *(Salix)*	1-3
Alder *(Alnus)*	3-5
Cottonwood *(Populus)*	7-10

Milestones

Milestones will be used for determining if BMP's are being implemented and standards attained. For this TMDL several milestones will be established as follows:

Education/Outreach Milestone

Implement outreach programs for schools, educators, citizens, government officials, landowners, land managers, resource professionals and agency representatives.

Grazing/Rangeland Milestones

Demonstrate rotational grazing and other grazing/wildlife management systems. Implement projects on federal, State and private lands for riparian restoration with improved grazing/wildlife management.

Agriculture Milestones

Implement erosion control BMPs.

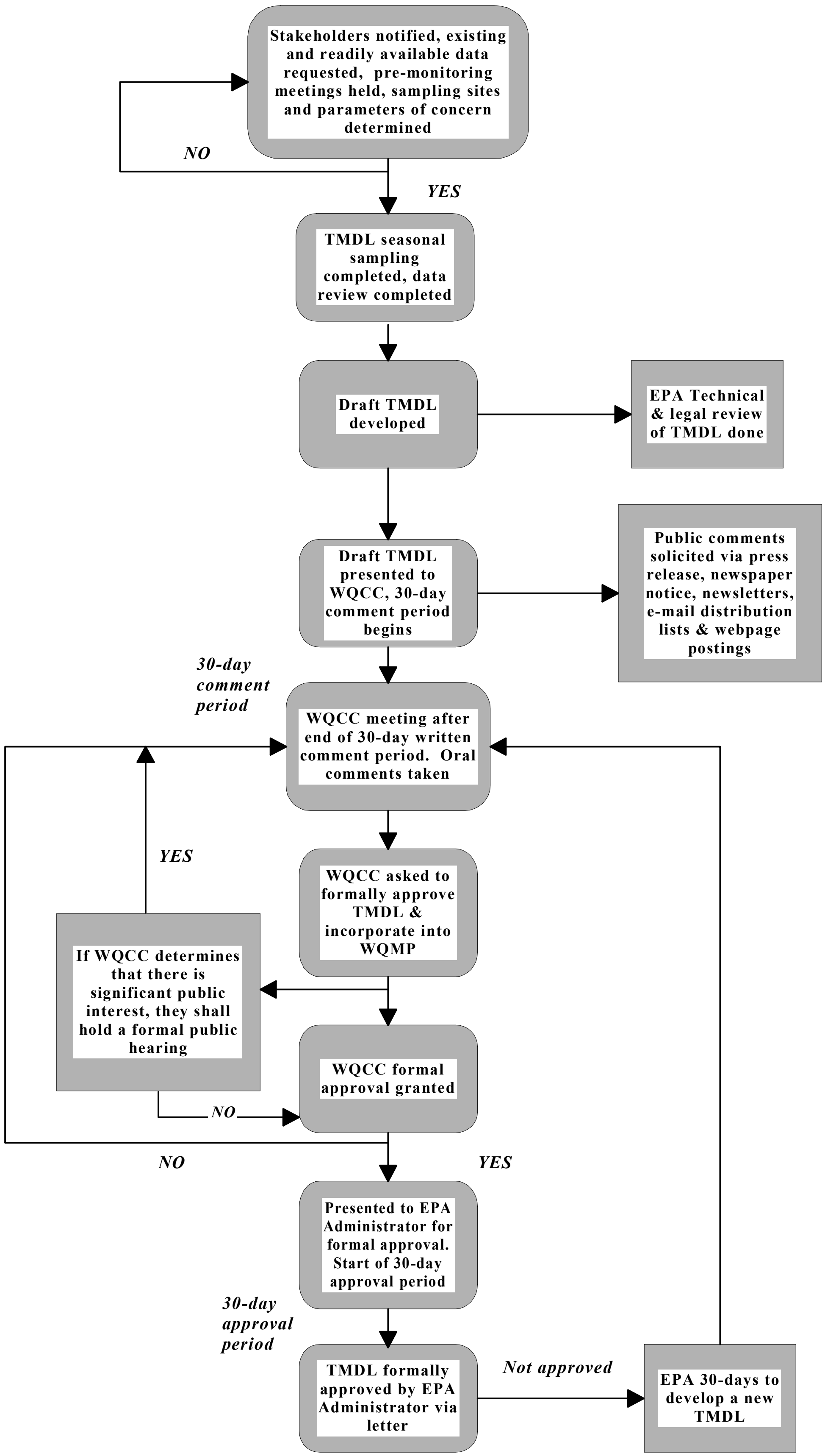
Measures of Success

- Improved bank stability and vegetation stability by increasing root systems thus decreasing sediment inputs into the system and improving canopy densities. Measurement tools include but are not limited to pebble counts, embeddedness, % fines, canopy densities and root density estimates.
- Increased stream shade. Measurement tool spherical densiometer readings.
- Measurable reductions in TSS and peak turbidity. Measurement tools include but are not limited to pebble counts, embeddedness, % fines, turbidity readings and lab analyses.
- Increased interagency cooperation via communications with the land management agencies, soliciting their input into the process.
- Increased public participation via pre-monitoring and post-monitoring meetings.
- Expanded water quality database and understanding of the relationships between traditional management activities and NPS pollution.
- Increased interagency agreement in determining BMP application and suitability.
- Appropriateness of milestones will be re-evaluated periodically, depending on the BMPs that were implemented. Further implementation of this TMDL will be revised based on this re-evaluation.

Public Participation

Public participation was solicited in development of this TMDL **(Figure 5)**. The draft TMDL was made available for a 30-day comment period starting **August 14, 2001**. Response to comments is attached as Appendix F of this document. The draft document notice of availability was extensively advertised via newsletters, email distribution lists, web page postings (http://www.nmenv.state.nm.us/) and press releases to area newspapers.

Figure 5. **Public Participation Flowchart**



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SWQB/NMED. 1998. State of New Mexico Procedures for Assessing Standards Attainment for 303(d) List and 305(b) Report Assessment Protocol

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Section 25, Watershed Management
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USGS, Biological Resource Division, Midcontinent Ecological Science Center, River Systems Management Section, Fort Collins, CO, 1997. The Stream Segment and Stream Temperature Models, Version 1.0

USGS. 2001. Draft Analysis of the Magnitude and Frequency of the 4-day, 3 year-Low Flow Discharge and Regional Low-Flow Frequency Analysis for Unregulated Streams in New Mexico. Draft Report 01-xxxx. Albuquerque, NM.

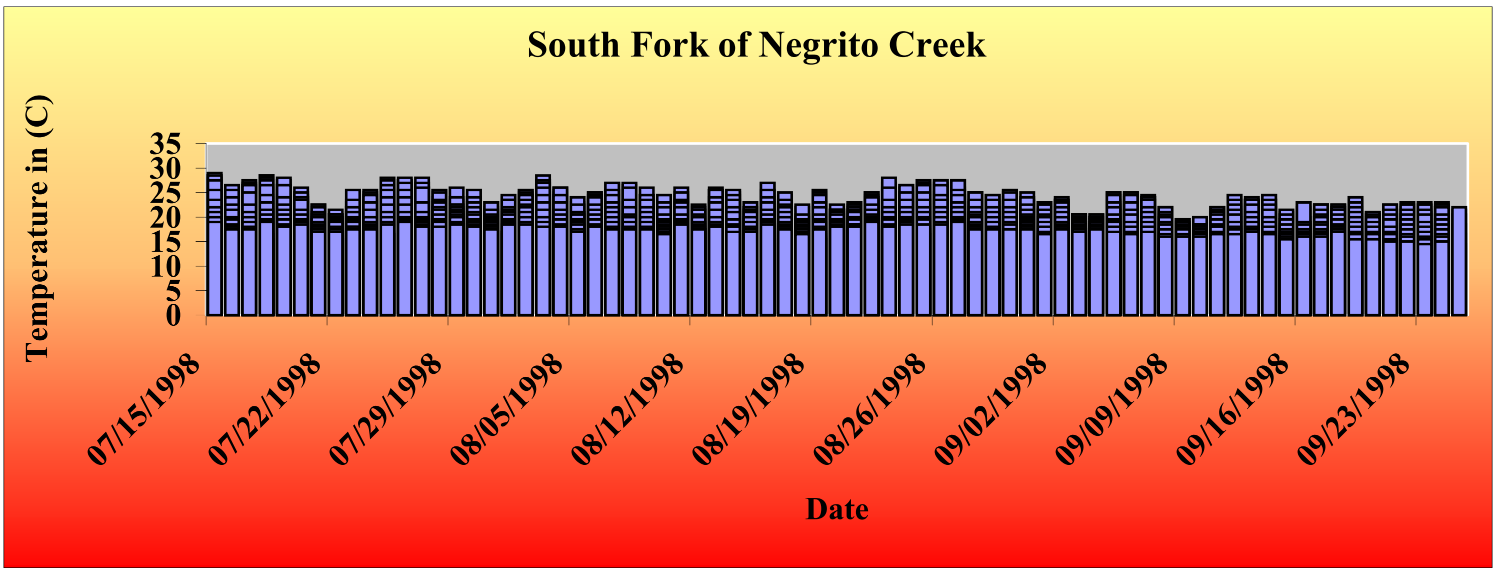
Appendices

Appendices

Appendix A Thermograph/Geomorphologic Data and Sites

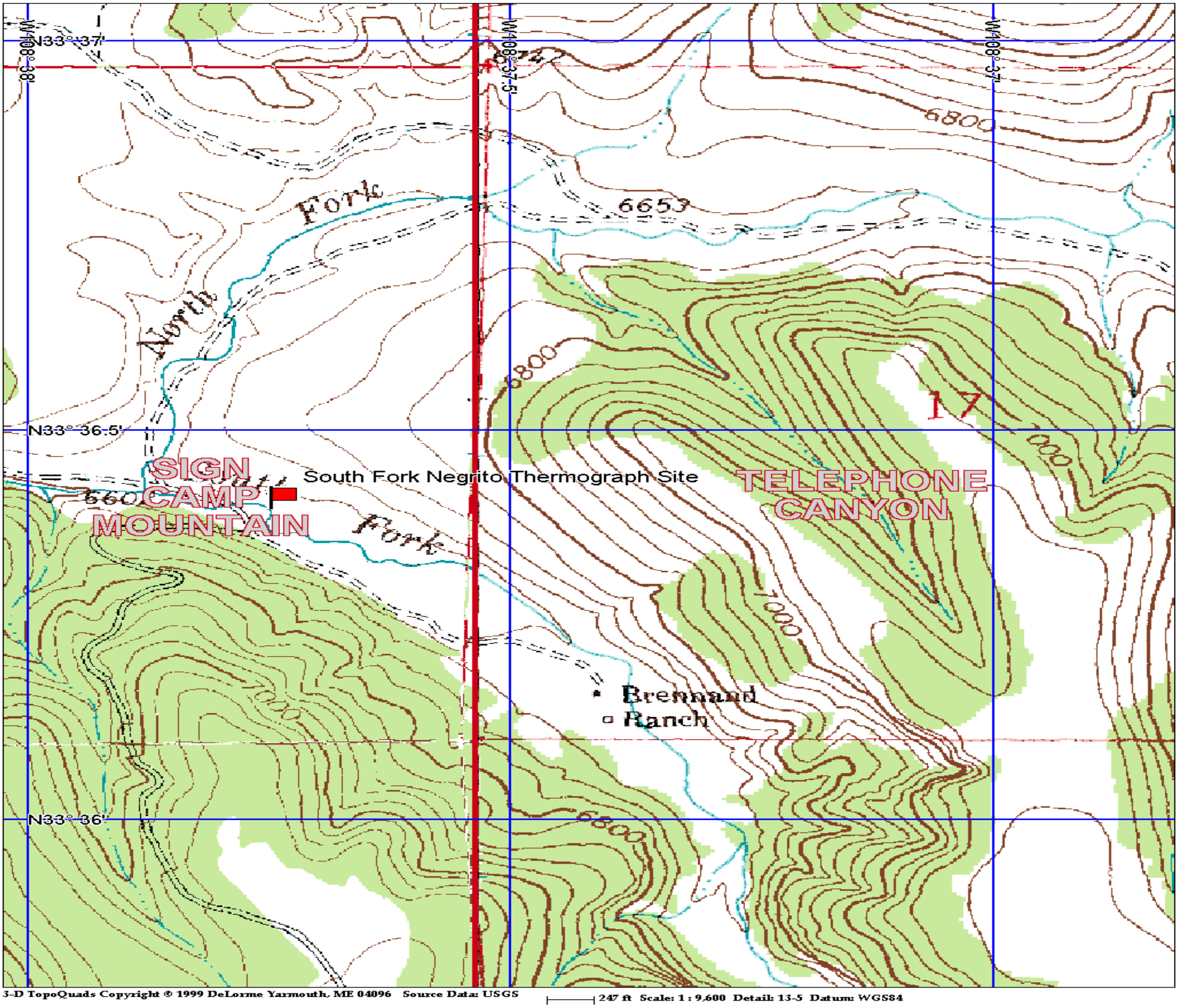
Thermograph Data
July 15 1998- September 25, 1998

Total Readings	1730
Max. Temp.	29
# Values>20	574
%Values>20	33.2
Avg. Temp.	18.99
Minimum Temp.	12

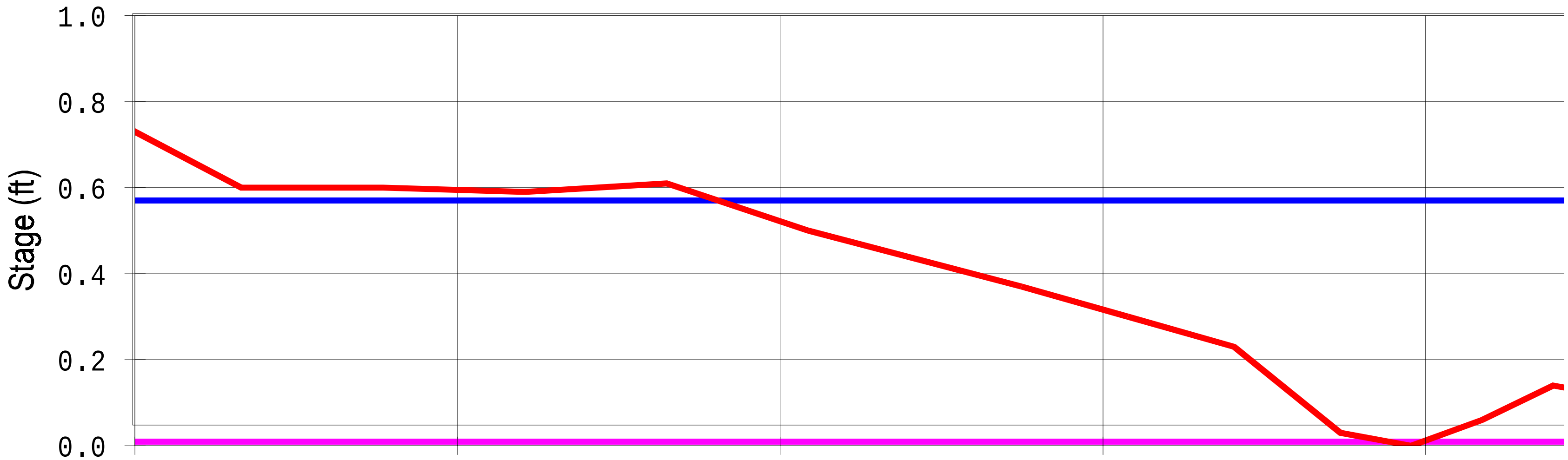


Each bar on the graph represents the 24-hour maximum temperature on each day (i.e. 23°C on 7/22/98).

South Fork of Negrito Creek Thermograph Site



South Fork of Negrito Creek Cross-Channel Profile



Rosgen's Classification: "F" Width to Depth Ratio: 43 Entrenchment Ratio: 1.3

Definitions:

THALWAG = the thread of the deepest water

SINUOSITY = stream length/valley length or valley slope/channel slope

ENTRENCHMENT RATIO = the degree of vertical containment of a river channel (width of the flood prone area at an elevation twice the maximum bankfull depth/bankfull width

W/D RATIO = the shape of the channel cross-section (ratio of bankfull width/mean bankfull depth)

SLOPE = slope of the water surface averaged for 20-30 channel widths

Appendix B SSTEMP Model Outputs

South Fork of Negrito Creek

SSTEMP V3 6

Run #1: MODEL CALIBRATION RUN

Min temp is within +/- 7% of Actual July Data

Avg. temp is within +/- 6% of Actual July Data

Max. temp. is within +/- 0.5% of Actual July Data

2.0	Segment Inflow	cfs
66.2	Inflow Temperature	°F
2.0	Segment Outflow	cfs
55.00	Lateral Temperature	°F
5.4	Segment Length	mi
0.04	Manning's n	
7287.0	Elevation Upstream	ft
6645.0	Downstream	ft
6.00	Width's A Term	
0.0	B Term where W = A*Q**B	
1.650	Thermal Gradient $j/m^2/s/c$	
82.70	Air Temperature	°F
10.0	Relative Humidity	%
3.000	Wind Speed	mph
90.00	Percent Possible Sun	%
675.00	Solar Radiation	Langleys
13.75	Daylight Length	hr
25.00	Segment Shading	%
55.00	Ground Temperature	°F
0.0	Dam at Inflow (Yes=1 No=0)	

Minimum 24-hour temperature	58.04°F
Mean 24-hour temperature	70.90°F
Maximum 24-hour temperature	83.77°F

Run #2

2.0	Segment Inflow	cfs
66.2	Inflow Temperature	°F
2.0	Segment Outflow	cfs
55.00	Lateral Temperature	°F
5.4	Segment Length	mi
0.04	Manning's n	
7287.0	Elevation Upstream	ft
6645.0	Downstream	ft
6.00	Width's A Term	
0.0	B Term where W = A*Q**B	
1.650	Thermal Gradient $j/m^2/s/c$	
82.70	Air Temperature	°F
10.0	Relative Humidity	%
3.000	Wind Speed	mph
90.00	Percent Possible Sun	%
675.00	Solar Radiation	Langleys
13.75	Daylight Length	hr
35.00	Segment Shading	%
55.00	Ground Temperature	°F
0.0	Dam at Inflow (Yes=1 No=0)	

Minimum 24-hour temperature	57.90°F
Mean 24-hour temperature	69.62°F
Maximum 24-hour temperature	81.34°F

Run #3

2.0	Segment Inflow	cfs
66.2	Inflow Temperature	°F
2.0	Segment Outflow	cfs
55.00	Lateral Temperature	°F
5.4	Segment Length	mi
0.04	Manning's n	
7287.0	Elevation Upstream	ft
6645.0	Downstream	ft
6.00	Width's A Term	
0.0	B Term where W = A*Q**B	
1.650	Thermal Gradient $j/m^2/s/c$	
82.70	Air Temperature	°F
10.0	Relative Humidity	%
3.000	Wind Speed	mph
90.00	Percent Possible Sun	%
675.00	Solar Radiation	Langleys
13.75	Daylight Length	hr
55.00	Segment Shading	%
55.00	Ground Temperature	°F
0.0	Dam at Inflow (Yes=1 No=0)	

Minimum 24-hour temperature	57.84°F
Mean 24-hour temperature	67.01°F
Maximum 24-hour temperature	76.18°F

Run #4

2.0	Segment Inflow	cfs
66.2	Inflow Temperature	°F
2.0	Segment Outflow	cfs
55.00	Lateral Temperature	°F
5.4	Segment Length	mi
0.04	Manning's n	
7287.0	Elevation Upstream	ft
6645.0	Downstream	ft
6.00	Width's A Term	
0.0	B Term where W = A*Q**B	
1.650	Thermal Gradient $j/m^2/s/c$	
82.70	Air Temperature	°F
10.0	Relative Humidity	%
3.000	Wind Speed	mph
90.00	Percent Possible Sun	%
675.00	Solar Radiation	Langleys
13.75	Daylight Length	hr
87.00	Segment Shading	%
55.00	Ground Temperature	°F
0.0	Dam at Inflow (Yes=1 No=0)	

Minimum 24-hour temperature	58.28° F
Mean 24-hour temperature	62.70° F
Maximum 24-hour temperature	67.12° F

Run #5

2.0	Segment Inflow	cfs
66.2	Inflow Temperature	°F
2.0	Segment Outflow	cfs
55.00	Lateral Temperature	°F
5.4	Segment Length	mi
0.04	Manning's n	
7287.0	Elevation Upstream	ft
6645.0	Downstream	ft
6.00	Width's A Term	
0.0	B Term where W = A*Q**B	
1.650	Thermal Gradient $j/m^2/s/c$	
82.70	Air Temperature	°F
10.0	Relative Humidity	%
3.000	Wind Speed	mph
90.00	Percent Possible Sun	%
675.00	Solar Radiation	Langleys
13.75	Daylight Length	hr
88.3	Segment Shading	%
55.00	Ground Temperature	°F
0.0	Dam at Inflow (Yes=1 No=0)	

Minimum 24-hour temperature	58.31°F
Mean 24-hour temperature	62.52°F
Maximum 24-hour temperature	66.73°F

Appendix C Average Base Flow Discharge Measurements

Field Measurement Date At observed Low Flow Conditions	Discharge
6/8/98	**2.0 cfs**
6/9/98	**1.9 cfs**
6/10/98	**2.0 cfs**
6/11/98	**2.1 cfs**

Discharge Measurement:

The discharge equals the product of the water velocity multiplied by the area of flow. A partial section is a rectangle whose depth is equal to the sounded depth at a meter location (a vertical) and whose width is equal to the sum of half the distances to the adjacent verticals. At each vertical the following measurements are made: (1) the distance to a reference point on the bank, (2) the depth of the water, and (3) the velocity as indicated by a current meter at one or two points in the vertical. The velocity is either calculated from the number of bucket wheel revolutions, or read directly from an automatic counter/computer. The low flow conditions, averaged over a four-day observation period on the South Fork of Negrito Creek, were 2.0 cfs.

Appendix D Average Precipitation and Air Temperature Data

Source: Western Regional Climate Center
GLENWOOD, NEW MEXICO (293577)
Period of Record Monthly Climate Summary
Period of Record: 1/ 1/1939 to 6/30/2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	56.5	61.0	66.4	74.7	82.2	91.2	91.9	89.4	85.7	76.5	65.3	57.2	74.8
Average Min. Temperature (F)	25.0	27.6	31.5	37.0	43.3	52.1	60.0	58.9	52.0	41.5	30.3	25.1	40.4
Average Total Precipitation (in.)	1.28	1.03	1.00	0.49	0.59	0.63	2.74	2.54	1.59	1.56	0.93	1.52	15.90
Average Total SnowFall (in.)	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.6
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record:
Max. Temp: 80.2% Min. Temp.: 80.2% Precipitation: 82.3% Snowfall: 67.7% Snow Depth: 76.1%

Humidity :

Data from the *Interactive Weather Information Network (IWIN),* National Weather Service Online

THE ALBUQUERQUE NM CLIMATE SUMMARY FOR 19 JUNE 2001...
CLIMATE NORMAL PERIOD 1961 TO 1990
CLIMATE RECORD PERIOD 1931 TO 2000

TEMPERATURE / HUMIDITY

AT 6 AM 68 / 31 PERCENT
AT NOON 88 / 16 PERCENT
AT 6 PM 92 / 15 PERCENT

Calibration of the model reveals that the elevational differences between Albuquerque and the San Francisco Watershed, result in the South Fork Negrito modeled humidity level being lower that the reported values above.

Appendix E: Pollutant Source(s) Documentation Protocol

POLLUTANT SOURCE(S) DOCUMENTATION PROTOCOL

New Mexico Environment Department
Surface Water Quality Bureau
July 1999

This protocol was designed to support federal regulations and guidance requiring states to document and include probable source(s) of pollutant(s) in their §303(d) Lists as well as the States §305(b) Report to Congress.

The following procedure should be used when sampling crews are in the field conducting water quality surveys or at any other time field staff are collecting data.

Pollutant Source Documentation Steps:

1). Obtain a copy of the most current §303(d) List.

2). Obtain copies of the **Field Sheet for Assessing Designated Uses and Nonpoint Sources of Pollution**.

3). Obtain digital camera that has time/date photo stamp on it from the Watershed Protection Section.

4). Obtain GPS unit and instructions from Neal Schaeffer.

5). Identify the reach(s) and probable source(s) of pollutant in the §303(d) List associated with the project that you will be working on.

6). Verify if current source(s) listed in the §303(d) List are accurate.

7). Check the appropriate box(s) on the field sheet for source(s) of nonsupport and estimate percent contribution of each source.

8). Photodocument probable source(s) of pollutant.

9). GPS the probable source site.

10). Give digital camera to Gary King for him to download and create a working photo file of the sites that were documented.

11). Give GPS unit to Neal Schaeffer for downloading and correction factors.

12). Enter the data off of the **Field Sheet for Assessing Designated Uses and Nonpoint Sources of Pollution** into the database.

13). Create a folder for the administrative files, insert field sheet and photodocumentation into the file.

This information will be used to update §303(d) Lists and the States §305(b) Report to Congress.

FIELD SHEET FOR ASSESSING DESIGNATED USES AND NONPOINT SOURCES OF POLLUTION

CODES FOR USES NOT FULLY SUPPORTED

☐	HQCWF =	HIGH QUALITY COLDWATER FISHERY	☐	DWS	=	DOMESTIC WATER SUPPLY
☐	CWF =	COLDWATER FISHERY	☐	PC	=	PRIMARY CONTACT
☐	MCWF =	MARGINAL COLDWATER FISHERY	☐	IRR	=	IRRIGATION
☐	WWF =	WARMWATER FISHERY	☐	LW	=	LIVESTOCK WATERING
☐	LWWF =	LIMITED WARMWATER FISHERY	☐	WH	=	WILDLIFE HABITAT

Fish culture, secondary contact and municipal and industrial water supply and storage are also designated in particular stream reaches where these uses are actually being realized. However, no numeric standards apply uniquely to these uses.

REACH NAME:

SEGMENT NUMBER:

BASIN:

PARAMETER:

STAFF MAKING ASSESSMENT:

DATE:

CODES FOR SOURCES OF NONSUPPORT (CHECK ALL THAT APPLY)

☐ 0100 INDUSTRIAL POINT SOURCES

☐ 0200 MUNICIPAL POINT SOURCES
☐ 0201 DOMESTIC POINT SOURCES

☐ 0400 COMBINED SEWER OVERFLOWS

☐ 1000 AGRICULTURE
☐ 1100 NONIRRIGATED CROP PRODUCTION
☐ 1200 IRRIGATED CROP PRODUCTION
☐ 1201 IRRIGATED RETURN FLOWS
☐ 1300 SPECIALTY CROP PRODUCTION (e.g., truck farming and orchards)
☐ 1400 PASTURELAND
☐ 1500 RANGELAND
☐ 1600 FEEDLOTS - ALL TYPES
☐ 1700 AQUACULTURE
☐ 1800 ANIMAL HOLDING/MANAGEMENT AREAS
☐ 1900 MANURE LAGOONS

☐ 2000 SILVICULTURE
☐ 2100 HARVESTING, RESTORATION, RESIDUE MANAGEMENT
☐ 2200 FOREST MANAGEMENT
☐ 2300 ROAD CONSTRUCTION or MAINTENANCE

☐ 3000 CONSTRUCTION
☐ 3100 HIGHWAY/ROAD/BRIDGE
☐ 3200 LAND DEVELOPMENT
☐ 3201 RESORT DEVELOPMENT
☐ 3300 HYDROELECTRIC

☐ 4000 URBAN RUNOFF/STORM SEWERS

☐ 5000 RESOURCES EXTRACTION
☐ 5100 SURFACE MINING
☐ 5200 SUBSURFACE MINING
☐ 5300 PLACER MINING
☐ 5400 DREDGE MINING
☐ 5500 PETROLEUM ACTIVITIES
☐ 5501 PIPELINES
☐ 5600 MILL TAILINGS
☐ 5700 MINE TAILINGS
☐ 5800 ROAD CONSTRUCTION/MAINTENANCE 8400
☐ 5900 SPILLS

☐ 6000 LAND DISPOSAL
☐ 6100 SLUDGE
☐ 6200 WASTEWATER
☐ 6300 LANDFILLS
☐ 6400 INDUSTRIAL LAND TREATMENT
☐ 6500 ONSITE WASTEWATER SYSTEMS (septic tanks, etc.)
☐ 6600 HAZARDOUS WASTE
☐ 6700 SEPTAGE DISPOSAL
☐ 6800 UST LEAKS

☐ 7000 HYDROMODIFICATION
☐ 7100 CHANNELIZATION
☐ 7200 DREDGING
☐ 7300 DAM CONSTRUCTION/REPAIR
☐ 7400 FLOW REGULATION/MODIFICATION
☐ 7500 BRIDGE CONSTRUCTION
☐ 7600 REMOVAL OF RIPARIAN VEGETATION
☐ 7700 STREAMBANK MODIFICATION OR DESTABILIZATION
☐ 7800 DRAINING/FILLING OF WETLANDS

☐ 8000 OTHER
☐ 8010 VECTOR CONTROL ACTIVITIES
☐ 8100 ATMOSPHERIC DEPOSITION
☐ 8200 WASTE STORAGE/STORAGE TANK LEAKS
☐ 8300 ROAD MAINTENANCE or RUNOFF
☐ 8400 SPILLS
☐ 8500 IN-PLACE CONTAMINANTS
☐ 8600 NATURAL
☐ 8700 RECREATIONAL ACTIVITIES
☐ 8701 ROAD/PARKING LOT RUNOFF
☐ 8702 OFF-ROAD VEHICLES
☐ 8703 REFUSE DISPOSAL
☐ 8704 WILDLIFE IMPACTS
☐ 8705 SKI SLOPE RUNOFF
☐ 8800 UPSTREAM IMPOUNDMENT
☐ 8900 SALT STORAGE SITES

☐ 9000 SOURCE UNKNOWN

Appendix F Public Comments

September 18, 2001

Sent via facsimile, 505-827-0160, hard copy to follow

Mr. David Hogge
New Mexico Environment Department
Surface Water Quality Bureau
P.O. Box 26110
Santa Fe, NM 87502

RE: Southwestern New Mexico TMDLs

Dear Mr. Hogge:

The following comments on southwestern New Mexico draft TMDLs and proposed de-listing of several streams and waters from the 303(d) list is submitted on behalf of the nearly 6,000 members of the Center for Biological Diversity. The Center for Biological Diversity (CBD), formed in 1989, protects endangered species and wild places of western North America and the Pacific through science, policy, education, and environmental law.

Please include the Center on the mailing list as an interested party for all future actions by the Bureau involving the Clean Water Act 303(d) list and development of TMDL's. Our comments here will be unfortunately brief because we did not receive notice of the Bureau's proposed action until well into the comment period.

NMED Response

The Center for Biological Diversity has been added to our mailing list. Current information on the TMDL program can also be found on our web page (www.nmenv.state.nm.us/swqb/swqb.html).

CBD believes the proposed de-listings are neither adequately justified or explained. The Bureau's reliance on qualitative narrative standards rather than quantitative numerical standards is especially problematic. Additionally, many of the streams are proposed for de-listing despite the fact that their biological assessment numbers are quite low and some appear to be more impaired than the last time an assessment was conducted. For example, Whitewater Creek is proposed for de-listing despite the fact that is scored only 59% on its biological assessment and its percent fines increased from 5% to 13%.

NMED Response

The Protocol for the Assessment of Stream Bottom Deposits is used to determine the level of use attainment using benthic macroinvertebrate and percent fines data collected in the reach being assessed. According to this USEPA-approved protocol, the benthic macroinvertebrate community combined with the percent fines at this site indicate a rating of full support, impacts observed (FSIO). Clarifying text was added to the de-list letter.

SWQB plans to refine benthic macroinvertebrate sampling protocols and interpretation methods in the near future.

With respect to the draft TMDL's, the draft documents are very general, and do not provide enough details (i.e. which polluters will be required to act) to provide specific comments. However, CBD is concerned that the Bureau presently appears to be relying solely on Best Management Practices (BMPs) to implement the program. BMP's are mitigation measures, often ineffectual, not measures for actually cleaning up impaired watersheds.

NMED Response

Presently, there is no requirement under the federal Clean Water Act for reasonable assurances for implementation of nonpoint source pollution. As stated in existing guidance (Guidance for Water Quality-Based Decisions: The TMDL Process, EPA 440/4-91-001, April 1991) implementation of nonpoint source BMPs is through voluntary programs such as section 319 of the Clean Water Act. Site-specific or watershed-specific voluntary actions are mechanisms that may provide reasonable assurances for nonpoint sources. The SWQB believes that the Watershed Protection Program in New Mexico is a strong program that will provide for the implementation of nonpoint source BMPs.

In this watershed, public awareness and involvement will be crucial to the successful implementation of BMPs and improved water quality. Staff from the SWQB will work with stakeholders to provide the guidance in developing the Watershed Restoration Action Strategy (WRAS). The WRAS is a written plan intended to provide a long-range vision for various activities and management of resources in a watershed. It includes opportunities for private landowners and public agencies to reduce and prevent impacts to water quality. This long-range strategy will become instrumental in coordination, reducing, and preventing further water quality impacts in the watershed. SWQB staff assists with technical assistance such as the selection and application of BMPs needed to meet WRAS goals. The watershed management plans would include any specific BMPs for activities that may be contributing to the water quality impairment. It is not the intention of the SWQB to provide an all inclusive watershed management plan without watershed participation.

Thank you for this opportunity to comment. Please ensure we are provided copies of future 303(d) and TMDL comments. Notice of the availability of these documents may also be sent to my email address listed in the letterhead.

Sincerely,

Brian Segee

September 12,2001

David Hogge
TMDL Coordinator
NM Environment Department
Surface Water Quality Bureau
1190 St. Francis Drive
Santa Fe, NM 87502

Re: Comments on draft TMDLs for the Gila and San Francisco Watersheds

Dear Mr. Hogge:

The New Mexico Municipal Environmental Quality Association has reviewed the following draft TMDLs. Opened for public comment on August 14, 2001:

- Black Canyon Creek: Temperature
- Centerfire Creek: Conductivity
- East Fork of the Gila River and Taylor Creek: Metals (Chronic aluminum)
- Mogollon Creek: Metals (Chronic aluminum)
- Negrito Creek: Temperature
- San Francisco River: Temperature
- Taylor Creek: Temperature
- Tularosa River: Conductivity
- Whitewater Creek: Turbidity

Association comments are attached, arranged alphabetically by stream segment.

Please contact me or Legislative Liaison Regina Romero at 982-5573 with questions or comments.

Best Regards,

William F. Fulginiti
Executive Director

New Mexico Municipal Environmental Quality Association
Comments Regarding Draft TMDLs for the
Gila River Watershed

September 12, 2001

South Fork of Negrito Creek: Temperature

- There is no discussion in the draft TMDL indicating that the SSOLAR, SSHADE or SSTEMP models were field-verified with in situ measurements on Negrito Creek. Was model validation performed and, if not, what assurances can NMED offer of model accuracy?

NMED Response

The output of the SSTEMP model (i.e., the calculated average, maximum, and minimum temperatures) is compared to actual thermograph data during the model calibration run. The input values and results of the model calibration run are shown as Run #1 in Appendix B and are summarized on the "Current Field Condition" line in the model output table. The output values of the SSSHADE and SSSOLAR submodels are input values in the SSTEMP model. These SSSHADE and SSSOLAR output values are calculated using several high quality field and topographic measurements as detailed in the text of the document. Continuous, direct measurement of solar radiation and total shade on a stream reach scale is not possible, which is why these values need to be calculated in the SSSHADE and SSSOLAR submodels for input into the SSTEMP model. The assumptions and limitations of the SSTEMP model can be found in the text of the document. Clarifying text was added to the Load Allocation section, the model output table, and Appendix B.

- On page 12, the first paragraph under the heading *Temperature Allocations as Determined by Percent (%) Shade* indicates that the SSTEMP model estimates attainment of the 20°C temperature standard when total shade is 88% or higher. In contrast, the model summary table on page 16 shows that the temperature standard is achieved when percent total shade reaches 87%. Also, the page reference to the model summary table is incorrect.

NMED Response

The text was updated to read "87." The page reference to the model summary was removed.

- On page 14, possible reason number 3 for elevated summertime stream temperatures suggests that removal of riparian vegetation can reduce base flows in streams. Intuitively, removal of vegetation should reduce evapotranspiration and cause an increase in stream base flow. A specific reference scientific reference(s) confirming the stated counter-intuitive relationship should be included.

NMED Response

The intention of this comment in the text was to address the usefulness of riparian cover in providing shade to streams. Stream temperatures can be reduced by riparian vegetation directly through shading and indirectly through low width/depth ratios typically encouraged by riparian vegetation. Although removal of upland vegetation has been shown to increase water yield, studies show that removal of riparian vegetation along the stream channel subjects the water surface and adjacent saturated soil surfaces to wind and solar radiation, partially offsetting the reduction in transpiration with evaporation. In losing stream reaches, increased stream temperatures can result in increased streambed infiltration which can result in lower base flow (Constantz et al., 1994). Furthermore, less infiltration will occur in a reach with a lower surface area of the bed, i.e., a stream with a lower width/depth ratio (Franklin, 2001). The type of riparian vegetation must also be considered. Invasive non-native species such as tamarisk maintain high transpiration rates through periods of stress. Willows are cottonwoods are obligate phreatophytes, while tamarisk is capable of extracting water from less saturated soils. A long-term USGS study observed that removal of non-native tamarisk from the floodplain of the Gila River resulted in a reduction of evapotranspiration and sections of the river that had previously been losing reaches became gaining reaches (Culler et al., 1982).

References:

Constantz, J., C.L. Thomas, and G. Zellweger. 1994. Influence of diurnal variations in stream temperature on streamflow loss and groundwater recharge. Water Resources Research 30:3253-3264.

Culler, R.C, R.L Hanson, R.M. Myrick, R.M. Turner, and F.P. Kipple. 1982. Evaporation before and after clearing phreatophytes, Gila River floodplain, Graham County, Arizona. USGS Professional Paper 655-P.

Franklin, A. 2001. Water consumption by riparian systems: a review of current knowledge.NMED/SWQB. Santa Fe, NM.

- On page 14, it is unclear how the subheadings under the first bullet are related to the conservative assumption that the warmest time of the year was used in modeling.

NMED Response

The three subheadings under the first bullet are meant to provide the reader with background information related to the variables used in the model relating to temperature. No changes were made in the text based on your comment.

- On page 14, the second bullet indicates that "measured, average discharge for this segment, for base flow conditions was used." However, comparing Appendix C and model parameters in Appendix B indicates that critical low flow for the segment was used in SSTEMP modeling. If average flow was used, the modeling approach is inconsistent with approaches used for temperature TMDLs on Black Canyon Creek and Taylor Creek in the same watershed.

NMED Response

Appendix C was corrected to be titled the "Average Baseflow Discharge Measurements." This was also done for the Taylor Creek temperature TMDL. The modeling approach was consistent for both Black Canyon Creek and Taylor Creek.

- On page 37, in Appendix A, the cross-channel profile for Negrito Creek has no scale for the ordinate axis.

NMED Response

The model used to develop this cross-channel profile was WinXSPRO. The ordinate axis is the horizontal position of the cross-section. This axis has been labeled per your comment. Additional specifics related to stream geomorphologic measures are available from the SWQB Surveillance and Standards Section.

New Mexico Environment Department September 13, 2001
Surface Water Quality Bureau
PO Box 26110
Santa Fe, NM 87502

RE: Comments on Proposed TMDL for Temperature for the S. Fork of Negrito Creek from the Confluence with the N. Fork to the Headwaters

Via facsimile (505) 827-0160 and mail

To Whom It May Concern;

The following constitute Forest Guardians' comments on the above-named TMDL. We welcome the opportunity to participate in the public decision-making process for an issue as important and crucial to water quality as TMDL development. We hope that our comments are taken into serious consideration as the TMDL moves toward final approval, and we encourage you to continue to keep us informed so that we may continue to be involved in this process.

I. Voluntary Best Management Practices (BMPs)

We contend that voluntary BMP's in the draft implementation plan comply with neither the letter nor the spirit of the Clean Water Act, and will not result in the eventual re-attainment of water quality standards as envisioned by the TMDL process. We therefore urge you to include mandatory BMPs in the final TMDLs in order to assure that water quality standards have a real chance to be attained. We base this comment on the following narrative.

A TMDL consists of a pollutant specific standard and a plan to meet that standard. The standard, or "target load" is the maximum amount of pollution that a river can take from all sources without violating water quality standards. Once this "target load" is established, the TMDL then mandates pollution reductions to the various sources of pollution in a watershed to meet that standard. Pollution reductions are achieved through "load allocations" which set the maximum amount of pollution each source can contribute. These load allocations are referred to as "wasteload allocations" or "WLAs" when applied to point sources and "load allocations" or "LAs" when applied to nonpoint sources. A TMDL, therefore, represents the "sum of the individual WLAs for point sources and LAs for nonpoint sources and natural background." 40 C.F.R. § 130.2(i).

At a minimum, each plan of implementation must include "reasonable assurances" that the WLAs or LAs will, in fact, be implemented and achieved. With respect to WLAs for point sources, such assurances are easily provided by demonstrating how the load allocations will be incorporated into the permit. 40 C.F.R. §130.7(a). In each permit, effluent limitations can be adjusted to ensure that the pollution reductions succeed. With respect to nonpoint sources, providing these assurances is more difficult because there are generally no permits to adjust. Rather, the TMDLs are implemented via BMPs which are incorporated into a state's water quality management plan as outlined in section 303(e) of the CWA. 33 U.S.C. § 1313(e); 40 C.F.R. § 130.7(a).

Once the "target load" and "load allocations" are established, the TMDL process gets underway. The next step is to transform the calculations in the TMDL into real, on-the-ground results--to implement the TMDL. As a last resort measure, Congress mandated that TMDLs succeed in improving water quality. TMDLs "shall be established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge." 33 U.S.C. § 1313(d)(1)(C). EPA agrees, stating that "TMDLs shall be established at levels necessary to attain and maintain . . . water quality standards." 40 C.F.R. § 130.7(c)(1). Whether or not a TMDL will improve water quality is therefore the standard for State TMDLs. 33 U.S.C. § 1313(d)(2).

"Reasonable assurances" are a required element of a TMDL and/or plan to implement a TMDL. Congress' intent to require reasonable assurances that TMDLs will be implemented to improve water quality is clearly reflected in the plain language of section 303 of the CWA, the legislative history of section 303 of the CWA, and the very purpose of the CWA. This is a reasonable conclusion because it ensures that the goals of the CWA are met.

In drafting the language of section 303 of the CWA, Congress consciously used the word "shall." States "shall" prepare TMDLs, "shall" establish such TMDLs at level necessary to implement water quality standards, "shall" disapprove TMDLs that fail to implement water quality standards, and "shall" have a management plan which includes TMDLs and a provision for "adequate implementation." 33 U.S.C. §§ 1313(d)(1)(C), 1313(e)(1), 1313(e)(3)(C), (F).

However the burden will fall primarily on the polluters to ensure that the BMPs are actually implemented. In NMED's own words from other TMDLs, cooperation from the polluters "will be pivotal in implementation of this TMDL." See Cordova Creek TMDL, 1999. The key word in NMED's plan is "cooperation." The polluters in that TMDL, like here, have the option of doing nothing. They can choose not to get involved-not to undertake the expensive and time consuming burden of implementing the BMPs. There are absolutely no obligations or mandates in the plan requiring polluters to implement the necessary BMPs.

By allowing section 319's voluntary program to be the sole basis for implementing the TMDL, the State is ignoring the "reasonable assurance" requirement. Unlike section 319's voluntary, consensus based approach under the CWA, TMDLs must "implement applicable water quality standards." 33 U.S.C. § 1313(d)(1)(C). Thus, unlike section 319 plans, TMDLs must provide assurances that pollution reductions will occur and that water quality will be improved. See 33 U.S.C. § 1313(d)(1)(C). The "purely voluntary" plan to implement the TMDL plainly fails to provide such assurances. As such, there clearly are no assurances that this TMDL will be implemented to improve water quality.

The evidence suggesting that "purely voluntary" plans generally do not work is overwhelming. The failure of sections 208 and 319 of the CWA, two voluntary programs to control nonpoint source pollution, provides a good illustration. Unlike the CWA's point source program, which includes mandatory effluent limitations outlined in federally issued permits, the nonpoint source programs of section 208 and 319 of the CWA are void of any meaningful federal mandates. Both programs are "purely voluntary." They rely on voluntary state planning and implementation, technical assistance, and ineffective financial incentives, rather than mandatory controls, to abate nonpoint source pollution. See 33 U.S.C. §§ 1288(b)(2)(F),1288(j),1329(h). The result is predictable.

Today, while point source pollution is at a twenty year low, nonpoint source pollution is out of control. In EPA's own words, nonpoint source pollution remains the Nation's largest source of water quality problems. It's the main reason that approximately 40 percent of surveyed rivers, lakes, and estuaries are not clean enough to meet basic uses such as fishing or swimming. The current nonpoint source pollution problem can be attributed to one factor: State reliance on voluntary compliance.

Under the voluntary schemes of sections 208 and 319 of the CWA, states are opting not to implement nonpoint source controls. States are reluctant to require controls because, as one observer noted, "the expense to states, both in terms of money and the political costs of imposing burdensome regulations on powerful agricultural interests, is potentially significant." See Houck, supra footnote 10 at 527. Without a "meaningful federal mandate, the states, with a few . . . exceptions have not implemented polluted runoff programs of their own." Id.

Even though EPA is well-aware of this fact, the "protection" Agency is allowing states to use the voluntary, incentive-based program under section 319 of the CWA, without any upgrades, to implement TMDLs. Once again, the results are predictable. A 1998 study of 55 TMDLs approved by EPA, many with voluntary implementation plans, showed a "near-total avoidance of implementation measures." Oliver A. Houck TMDLs IV: The Final Frontier, 29 ELR 10469, 10481 (August, 1999). Today, EPA is aware of hundreds of "purely voluntary" TMDLs that are not being implemented.

Indeed, it was the "purely voluntary" nature of the 1965 Water Qaulity Act that led to the 1972 amendments and the birth of the TMDL program. See H.R. 11896 at 68, 69, 106, 107, 92nd Cong. (1972); S. Rep. No. 92-414, at 3675 (1972). Similar congressional concerns over the futility of voluntary measures prompted the 1935 amendments to the Federal Power Act, 16 U.S.C. §§ 797-817, the 1977 and 1990 amendments to the Clean Air Act ("CAA"), 42 U.S.C. §§ 7401-7671q, and the 1990 amendments to the Coastal Zone Management Act, 16 U.S.C. §§ 1451 to 1465 ("CZMA").

As one court noted, the 1935 amendment to the Federal Power Act, "made licensing a mandatory requirement" for all new projects. Cooley v. F.E.R.C., 843 F.2d 1464 (D.C. Cir. 1988) (citing S. Rep. No. 621, 74th Cong., 1st Sess. (1935) and First Iowa Hydro- Electric Coop. v. FPC, 328 U.S. 152 (1946)). The earlier, purely voluntary scheme "had proven inadequate for the development of a comprehensive system of water power regulation." Id.

In the 1977 amendments to the CAA, Congress again recognized the ineffectiveness of voluntary compliance. As the Sixth Circuit noted, "although some voluntary compliance and cooperation was achieved under the former version of the [CAA], Congress clearly found the earlier provisions an inadequate answer to the problem of interstate air pollution. Air Pollution Control Dist. of Jefferson County, Ky. v. U.S.E.P.A., 739 F.2d 1071,1091 (6th Cir.1984) (citing H. R. Rep. No. 294, 95th Cong., 1st Sess. 329). The new mandatory CAA provisions, "were intended to establish an effective mechanism for prevention, control, and abatement of interstate air pollution." Id. at 1091. In 1990, Congress amended the CAA once again, this time replacing a failing "discretionary" state permitting program with a mandatory federally enforceable permitting scheme. See 42 U.S.C. §§ 7661-7661d.

In addition, in 1990 Congress passed the "Coastal Zone Reauthorization Amendments of 1990" (CZARA), amending the 1972 CZMA, because the earlier program of providing federal grant money for "voluntary" state programs to was failing to protect coastal resources from nonpoint source pollution. Under the new approach, participating states are now required to prepare and submit to EPA for approval, a program to protect coastal waters from nonpoint source pollution. 16 U.S.C. § 1455b(a)(1). Before any federal money is dispersed, each state program must, at a minimum, include "enforceable policies and mechanisms to implement" the program. 16 U.S.C. § 1455(d)(16). CZMA defines "enforceable policy" to mean "State policies which are legally binding through constitutional provisions, laws, regulations, land use plans, ordinances, or judicial or administrative decisions, by which a State exerts control over private and public land and water uses and natural resources."16 U.S.C. § 1453(6a). The existence of an "enforceable policy" provides the requisite assurance that plans will, in fact, be implemented and pollution reductions achieved.

In amending all of these environmental statutes Congress repeatedly and consistently has recognized the futility of "purely voluntary" programs in achieving Congressional goals. Today, a number of states are following Congress' lead by recognizing the need for enforceable policies and abandoning the voluntary approach towards controlling nonpoint source pollution. In Idaho, for instance, the state's water pollution control law imposes an affirmative duty on nonpoint source polluters to implement BMPs in order to meet and implement water quality standards for all waters with TMDLs. See Idaho Code § 39-3618. Failure to implement BMPs in such waters, may result in a civil action from the state agency. See Idaho Code § 39-3622. The enforceable program is working. The TMDLs for Idaho's South Fork of the Salmon River provide a good illustration. These TMDLs, which include mandatory BMPs to minimize sediment inputs from forestry operations (e.g., slope stabilization projects, grass seeding) are succeeding in returning a highly valued Chinook salmon and steelhead population to the once polluted River.

In Maryland, the State's Department of the Environment has the authority to require enforceable permits for certain nonpoint source discharges. See Md. Code. Ann., Envir. § 9- 323(b). In addition, all soil and sediment pollution is prohibited, except for agricultural activities conducted in accordance with soil conservation and water quality plans. See Md. Code. Ann., Envir. § 9-322. A violation of these provisions may result in corrective action orders, injunctions, civil penalties, and even criminal prosecution. See Md. Code. Ann., Envir. §§ 9-334, 9-335, 9- 338, 9-342, 9-343. Other states such as California, Oregon, Georgia, Vermont, and Wisconsin have adopted similar, enforceable approaches towards remedying nonpoint source pollution problems.

As described above, there is an overwhelming amount of evidence suggesting that "purely voluntary" measures are generally ineffective and unreliable. As such, a purely voluntary plan of implementation clearly does not belong in the TMDL. As a last resort measure there must be "reasonable assurances" that all TMDLs will be implemented to improve water quality and, voluntary plans, by themselves, fail to provide such assurances. In fact, NMED even concedes in other TMDLs that even with implementation of numerous BMPs, the waterway at issue may not be able to meet water quality standards.

Therefore, this purely voluntary approach does not belong in this TMDL because, unlike other clean up programs under the CWA, a TMDL comes with a mandate–there must be "reasonable assurances" that the TMDL will be implemented and will improve water quality. We urge the State to adopt measures similar to the ones outlined above and adopted by other States that are effective. We also urge NMED to pressure the Water Quality Control Commission to "promulgate and publish regulations to prevent or abate water pollution in the state" as authorized by New Mexico's Water Quality Act. This authority is listed as an "Assurance" in the TMDL, and we feel is much more likely to reasonably assure that the TMDL actually leads to the attainment of WQS.

II. Impacts of Grazing

Very little, if any, of the discussion in the permit concerning sources of non-attainment includes a reference to grazing activities on the watershed and their devastating impact on water quality. To the contrary, grazing is primarily mentioned in the section entitled "Other BMP Activities in the Watershed". This section refers to "…the Forest Service and private landowners *actively* manage grazing activities…" (emphasis added). The proposed TMDL is written in reliance on this statement- that the entities involved with grazing are actively managing their activities. Our experience with monitoring grazing allotments on Forest Service lands leads to the complete opposite conclusion: that the entities involved with grazing on Forest service lands are not actively managing their allotments, and are in fact not complying with their management plans, if they have a current one. This is not merely a theory of ours either, as we have filed several lawsuits on the recent past concerning this exact issue in an attempt to force the Forest Service and the allotment holders to comply with their management plans and protect natural resources, including riparian areas and their waterways.

By not addressing impacts of grazing in the TMDL and at the very least developing BMPs to account for the potentially devastating effects of grazing on water quality, we believe the proposed TMDL is deficient and will not effectively reach it's goals. Unless *all* sources of non-point source pollution are addressed in a TMDL, the waterway will continue to be impaired and in need of scarce monetary and physical resources in order to restore it to it's proper condition, and the Clean Water Act's goals will never be realized.

III. Impacts of Water Diversions and Their Maintenance

Again, there is very little to no mention of the impacts of water diversions on this waterway and how they may adversely impact water quality. Thus, there are no strategies which address this source of pollution and no mitigative measures; therefore we seriously doubt that if this water is actually impacted by diversions, it will be able to improve and re-attain water quality standards as required by the Clean Water act.

IV. Impacts of Roads and Road Maintenance Activities

There is similarly very little discussion of roads and their potential or real impacts on the waterway and those effects are not addressed in the BMPs. Again, we question how NMED can seriously attempt to bring this water back into attainment of standards if *all* of the pollution sources are not properly accounted for.

V. Conclusion

We feel that this TMDL, as written, will not lead to a re-attainment of water quality standards in a timely and efficient manner, if at all. Our biggest concern is with the implementation of voluntary BMPs, which we fear will result in non-implementation. History shows that voluntary BMPs and similar measures rarely result in on the ground implementation, and that mandatory measures are the correct steps to take if the State is serious about cleaning up New Mexico's imperiled waters. We also find that the lack of thorough analysis and resultant paucity of corrective measures to address the adverse impacts of water diversions, grazing, and roads on this water is not in line with the Clean Water Act's goals and objectives.

We hope that when the final TMDL is written, you will reconsider this draft and remedy the problems that we have outlined above. Nothing less than the future of New Mexico's imperiled waters is at stake, and this resource is too important to not re-evaluate this potentially high impact document. Thank you for your consideration, and please contact us if you have any questions or concerns with our comments.

Sincerely,

Scott C. Cameron
Clean Water Coordinator
Forest Guardians

NMED Response

Several comments were received from the Forest Guardians. The following are responses by the SWQB to the Forest Guardians comments on the draft TMDL.

The SWQB would like to thank the Forest Guardians for their comments on this TMDL document. Presently, there is no requirement under the federal Clean Water Act for reasonable assurances for implementation of nonpoint source TMDLs. As stated in existing guidance (Guidance for Water Quality-Based Decisions: The TMDL Process, EPA 440/4-91-001, April 1991) implementation of nonpoint source TMDLs is through voluntary programs, such as section 319 of the Clean Water Act. According to the proposed regulations for TMDLs (40CFR part 130.2[p]), site-specific or watershed-specific voluntary actions are mechanisms which may provide reasonable assurances for nonpoint sources. The SWQB has implemented TMDLs statewide through a strong Watershed Protection Program. This program will continue to provide for the implementation of nonpoint source TMDLs.

Pursuant to Section (e)1 of the Clean Water Act (CWA), the Surface Water Quality Bureau (SWQB) has established appropriate monitoring methods to evaluate the effectiveness of controls or Best Management (BMP) activities. In order to optimize the efficiency of this monitoring effort, the SWQB has adopted a rotating basin monitoring strategy. This strategy is based on a 5-7 year return interval, and provides improved coordination and monitoring of BMP effectiveness.

Implementation plans are included in every TMDL in New Mexico. As stated in the TMDL document, this is a general implementation plan for activities to be established in the watershed. The SWQB will further develop the details of the plan with the help and cooperation of the stakeholders and other interested parties in the watershed. Detailed watershed management plans that include specific best management practices (BMPs) should be developed by and for watershed stakeholders. In this watershed, public awareness and involvement will be crucial to the successful implementation of this plan and improved water quality. Staff from the SWQB will work with stakeholders to provide the guidance in developing the Watershed Restoration Action Strategy (WRAS). The WRAS is a written plan intended to provide a long-range vision for various activities and management of resources in a watershed. It includes opportunities for private landowners and public agencies to reduce and prevent impacts to water quality. This long-range strategy will become instrumental in coordination, reducing, and preventing further water quality impacts in the watershed.

SWQB staff assists with technical assistance such as the selection and application of BMPs needed to meet WRAS goals.

The watershed management plans would include any specific BMPs for activities, such as grazing or road runoff and maintenance, that are identified as contributing to the water quality impairment. It is not the intention of the SWQB to provide an all inclusive watershed management plan in the TMDL documents. In order to obtain reasonable assurances for implementation in watersheds with multiple landowners including Federal, State, and private land, the SWQB has established Memoranda of Understanding (MOUs) with various Federal and State agencies. These MOUs provide for co-ordination and consistency in dealing with Nonpoint source issues.

Milestones are also used in the implementation plans in the TMDL documents to determine if BMPs are implemented and standards attained.

The SWQB does not regulate water quantity issues for the State of New Mexico. All inquiries related to water rights should be directed to the Office of the New Mexico State Engineer. The SWQB programs include a focus on upland source controls, not instream flow, in the form of BMPs to protect and improve water quality statewide.

COMMENTS SUBMITTED BY LANL

General Comments on all TMDLs

- In each of these documents, TMDLs are established based on knowledge of watershed-specific conditions, including monitoring data. However, in several cases the sections entitled "Linkage of Water Quality and Pollutant Sources" did not include a discussion of how the identified pollutant sources cause the water quality problems. For example, in the TMDL for conductivity in Centerfire Creek the section entitled "Linkage of Water Quality and Pollutant Sources" is a description of riparian Best Management Practices that have been implemented. It does not explain how the pollutant source (listed as "rangeland") causes the increase in conductivity. In addition, the sections entitled "Implementation Plan" were written at a level of generality that made it difficult to track suggested best management practices (BMPs) back to the specific watershed.

NMED Response

During the regularly scheduled watershed sampling, as well as any other water quality sampling, the NMED works to examine and document potential sources of water quality impairment along 303(d) listed waters. Unlike point sources, nonpoint source pollution in not always easily identified and tracked in a watershed. The SWQB follows a Source Documentation Protocol (found in the appendix section of the documents). The completed field sheets that are used following the Protocol were not included for the draft TMDLs. In the final version of the TMDL documents the completed field assessment sheets are provided. The SWQB makes no attempt to identify individual landowners as causing any water quality impairments. Categories of land ownership and land use are used to characterize potential sources of impairment. It is the intention of the SWQB to work together with all landowners in the watershed to implement activities such as best management practices in response to this TMDL document.

Presently, there is no requirement under the federal Clean Water Act for reasonable assurances for implementation of nonpoint source TMDLs. As stated in existing guidance (Guidance for Water Quality-Based Decisions: The TMDL Process, EPA 440/4-91-001, April 1991) implementation of nonpoint source TMDLs is through voluntary programs, such as section 319 of the Clean Water Act. According to the proposed regulations for TMDLs (40CFR part 130.2[p]), site-specific or watershed-specific voluntary actions are mechanisms that may provide reasonable assurances for nonpoint sources. The SWQB has implemented TMDLs statewide through a strong Watershed Protection Program. This program will continue to provide for the implementation of nonpoint source TMDLs.

Pursuant to Section (e)1 of the Clean Water Act (CWA), the Surface Water Quality Bureau (SWQB) has established appropriate monitoring methods to evaluate the effectiveness of controls or Best Management (BMP) activities. In order to optimize the efficiency of this monitoring effort, the SWQB has adopted a rotating basin monitoring strategy. This strategy is based on a 5-7 year return interval, and provides improved coordination and monitoring of BMP effectiveness.

Implementation plans are included in every TMDL in New Mexico. As stated in the TMDL document, this is a general implementation plan for activities to be established in the watershed. The SWQB will further develop the details of the plan with the help and cooperation of the stakeholders and other interested parties in the watershed. Detailed watershed management plans that include specific best management practices (BMPs) should be developed by and for watershed stakeholders. In this watershed, public awareness and involvement will be crucial to the successful implementation of this plan and improved water quality. Staff from the SWQB will work with stakeholders to provide the guidance in developing the Watershed Restoration Action Strategy (WRAS). The WRAS is a written plan intended to provide a long-range vision for various activities and management of resources in a watershed. It includes opportunities for private landowners and public agencies to reduce and prevent impacts to water quality. This long-range strategy will become instrumental in coordination, reducing, and preventing further water quality impacts in the watershed. SWQB staff assists with technical assistance such as the selection and application of BMPs needed to meet WRAS goals. The watershed management plans would include any specific BMPs for activities, such as grazing or road runoff and maintenance that are identified as contributing to the water quality impairment. It is not the intention of the SWQB to provide an all inclusive watershed management plan in the TMDL documents. In order to obtain reasonable assurances for implementation in watersheds with multiple landowners including Federal, State, and private land, the SWQB has established Memoranda of Understanding (MOUs) with various Federal and State agencies. These MOUs provide for co-ordination and consistency in dealing with nonpoint source issues.

- The selection of a margin of safety (MOS) has a significant impact on the calculation of load allocations. Though each of these documents includes qualitative discussion of uncertainties in the data used to derive the TMDLs, the overall result seems to be quite arbitrary, in that each MOS is either 10% or 15%. The recently released National Academy of Sciences report on the TMDL program recognizes that this is a nationwide issue, and recommends that "EPA should end the practice of arbitrary selection of the MOS and instead require uncertainty analysis as the basis for MOS determination."

NMED Response

SWQB has been consistent in its application of MOS throughout the development of TMDLs. Much of the consideration for developing MOS values is based on information available in the New Mexico Quality Assurance Project Plan (QAPP) for Water Quality Management Programs (2001). The QAPP is approved by EPA annually and provides the framework for water quality monitoring and data collection for the SWQB. This includes the use of precision and accuracy information as an explicit MOS value. Implicit MOS use conservative assumptions and critical conditions, which are consistent with nationally available MOS information.

NMED is in the process of developing a MOS Protocol that will further explore the science and rationale behind the development of specific MOS values for the TMDL documents. This document is expected to be completed in 2002 and will be available on the SWQB website.

Technical Comments on Draft TMDLs

Temperature TMDLs

General Comments:

- Each temperature TMDL includes a table showing the results of runs of the SSTEMP model. The first row of these tables shows "current field conditions". However, the temperature data differs from the field data summarized in Appendix A. Please clarify the relationship between the data in the appendices and the "current field conditions" data.

  Also, model run tables demonstrate the importance of shade cover to achievement of the temperature TMDLs. Please describe the field procedure that NMED used to estimate this value for the "current field conditions" row.

NMED Response

Each temperature TMDL includes a table showing the results of runs of the SSTEMP model. This first line of this table is the calculated "current field conditions" from the SSTEMP model for minimum, mean and maximum temperature. The SSTEMP program predicts the 24-hour minimum, mean and maximum daily water temperature for the set of variables provided in the model. These values in the table are the calculated temperatures from the model and do not include the actual measured temperature data as seen in Appendix A. Appendix A shows a summary of the actual thermograph data taken in the field. Appendix A data (the actual field data) is used to determine if there are violations of water quality standards and determine how closely the model estimates actual conditions in the field.

The percent total shade value in the model run table is the calculated percent total shade output value from the SSSHADE submodel. The SSSHADE model output breaks the total shade value into percent due to topographic influences and percent due to vegetative shade. The first line shows the SSSHADE values at the "current field conditions." This value is then incrementally increased and the model re-run until the resultant SSTEMP maximum temperature output value is below the water quality standard. The model runs summarized in the model output table are also in Appendix B. The field parameters that go into the SSSHADE submodel are detailed under the subheading "Determining Solar Shading (SSSHADE)."

Specific Comments

- San Francisco River TMDL, p.11 – This page introduces the acronym SNTEMP without explanation. What is the relationship between SNTEMP and SSTEMP? (This comment also applies to the Negrito South Fork TMDL, p.12, and the Black Canyon Creek TMDL, p.12.)

NMED Response

The documents have been updated to reflect your comment regarding SNTEMP. All references to SNTEMP have been changed to SSTEMP. SNTEMP is the entire stream network model while SSTEMP is the stream segment version that is used by SWQB to assess individual stream segments.

December 10, 2001

VIA FACSIMILE AND U.S. MAIL

Mr. David Hogge
New Mexico Environment Department
Surface Water Quality Bureau
P.O. Box 26110
Santa Fe, New Mexico 87502

Dear Mr. Hogge:

Re: ***Phelps Dodge Tyrone, Inc. Comments on Draft TMDLs and De-Listing Letters for Waterbodies in the Gila and San Francisco Watersheds***

Phelps Dodge Tyrone, Inc. ("PDTI") strongly supports NMED's draft TMDL and de-listing letters for waterbodies in the Gila and San Francisco watersheds. PDTI reviewed the draft documents and believes that they are technically and legally valid.

PDTI appreciates the opportunity to review the draft documents and encourages NMED to finalize the decisions represented by the documents. If we may be of any further assistance, please contact Mr. Ty Bays at (505) 538-7157.

Very truly yours,

Robert I. Pennington

cc: T. L. Shelley
T. R. Bays

Certified Mail 7000 0600 0025 0867 3819
Return Receipt Requested

Mr. David Hogge
NMED SWQB
PO Box 26110
Santa Fe, NM 87502

September 28, 2001

Dear Mr. Hogge;

The New Mexico Association of Conservation Districts would like to submit the following comments for the proposed TMDL for the San Francisco and Gila Watersheds. The soil and water conservation districts applaud the efforts of the New Mexico Environment Department to de-list water bodies based on credible scientific data.

The soil and water conservation districts are authorized under NMSA 1978 73-20-25 thru 73-20-49 to work with landowners to conserve and develop the natural resources in New Mexico. All of our programs are voluntary, incentive-based and definitely should be utilized to work with land owners to meet specific, water quality goals in a particular watershed.

We look forward to continuing our “on the ground” conservation work to gather “credible scientific data” and to assist landowners with best management practices that will meet water quality goals.

Please contact NMACD or the local district if we can assist with this effort.

Sincerely,

Debbie Hughes